



International Cooperative Programme on
Assessment and Monitoring of
Air Pollution Effects on Forests

Technical Report QA-RFoliar24

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

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1 INTRODUCTION

A high quality and comparable laboratory standard in all countries is indispensable for a European-wide survey of the state of forests. Small changes in nature should be detected in a reliable way and not the changes in laboratory quality. Important issues on this way are method harmonisations, QA/QC in the laboratory daily routines and the implementation of a regularly performed Interlaboratory Comparison Tests programme.

This Needle/Leaf Interlaboratory Comparison Test programme started with the first European Foliar-Interlaboratory Comparison Test on two certified standards (BCR 100-*beech leaves* and BCR 101 - *spruce needles*) in 1993. The data were submitted by post or fax and had to be rechecked from the laboratories. The entire data collection and analysis had to be carried out manually. The final report was not available for several months. The Interlaboratory Comparison Tests were carried out every two years until 2002.

Starting in 2003/2004 (6th Interlaboratory Comparison Test), an annual test program was set up and the tests were carried out by the Forest Foliar Co-ordinating Centre/Austria (FFCC). The data collection was done via the internet. The Needle/Leaf Interlaboratory Comparison Test program was opened for every interested laboratory.

From 2012, an internet-based web interface was used for data collection, to collect the billing information for the participation fee, for the data evaluation and for the creation of online qualification reports. The interface offers the option of initial data checks (decimal errors, non plausible results, max LOQ) immediately before the final evaluation. The results of the latest interlaboratory comparison are currently available within a few days, so that laboratories can react comparatively quickly in the event of unsatisfactory results. For this case a re-qualification procedure was set up, starting with the 11th Test in 2009 (see: <https://baw.ac.at/rz/bfwcms2.web?dok=7830>). This feedback procedure is mandatory for all *ICP-Forests laboratories* and showed very a positive effect on the data quality.

To support the participating laboratories and to exchange knowledge between them, meetings of the heads of the laboratories at regular intervals are organized from the ICP-Forests Working Group on quality assurance and quality control in laboratories. Leaf and needle reference materials for method validation and method verification are offered by FFCC (see: <https://baw.ac.at/rz/bfwcms2.web?dok=5146>).

Today this interlaboratory test program is open for every laboratory and it is financed by participation fee, by advertising, by selling reference materials, by ringtest sample collection and/or sample preparation from participating laboratories. An overview is given on the ICP-Forests webpage, by following link:

<https://icp-forests.net/group/qualityinlaboratories/page/foliage-and-litterfall-ringtest-and-qa-qc-information>

2 TASK, MATERIAL, PARTICIPANTS AND EVALUATION

2.1 Task

The Forest Foliar Co-ordinating Centre established the following timetable:

- Information of the participating labs (February 2023)
- Registration of the participants via internet (30th June 2023)
- Submission of the ring test samples (July 2023)
- Submission of the results from the labs (October-December 2023)
- Deadline of data input (1st January 2024)
- Evaluation according to DIN 38402-42:2005-09 (January 2024)
- Submission of the final report and the online qualification reports (February 2024)
- Re-qualification process finished (1st September 2024)

The mandatory parameters C, Ca, K, Mg, N, P and S had to be analysed from all *ICP-Forests laboratories*, optional parameters were As, B, Cd, Cr, Co, Cu, Fe, Hg, Mn, Ni, Pb and Zn.

Results from a lot of other elements could be submitted, too. All possible elements are shown in Figure 1.

Figure 1: Possible elements

Ia	IIa	IIIb	IVb	Vb	VIb	VIIb	VIIIb				Ib	IIb	IIIa	IVa	Va	Vla	VIIa	VIIIa
1 H																		2 He
3 Li	4 Be												5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg												13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr	
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe	
55 Cs	56 Ba	71 Lu	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn	
87 Fr	88 Ra	103 Lr	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Ds	111 Rg	112 Cn	113 Nh	114 Fl	115 Mc	116 Lv	117 Ts	118 Og	
		57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb			
		89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No			

	Mandatory (for ICP-Forests labs)		Optional (for ICP-Forests labs)		Additional (special interest for more labs)		Possible
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For each parameter four replicates per sample are necessary. The minimum sample weight for mandatory and optional elements should be 250 mg per replicate, in order to ensure the homogeneity of the sample material. All results must be calculated on a dry weight basis (105°C).

In case that an extra milling step is needed for C, N or S determinations using a micro elemental-analyzer for solids (sample weight < 100mg), milling a subsample of the total sample is recommended to avoid possible contamination (Cr, Ni, Fe).

The used pre-treatment method and the determination method must be specified by a code. This code was harmonized for all ringtests (foliage & litterfall, deposition & soil solution and soil) after the 4th Meeting of the Heads of the Laboratories in Zadar 2013.

For a more detailed evaluation all participating laboratories had to answer a questionnaire to obtain more information about the status of their quality control systems, their instrumentation, their sample numbers/year and about their methodological knowledge. *ICP-Forests laboratories* had to mark all parameters, if they plan to analyse and submit monitoring results to ICP-FORESTS PCC from the growing season 2023.

2.2 Material

In July 2023 the Austrian Federal Research Centre for Forests, Natural Hazards and Landscape (BFW) sent out four dried and powdered plant samples to 41 laboratories in 22 countries.

The samples consisted of:

1. Ash leaves (Austria)
2. Oak leaves (Slovenia)
3. Spruce needles (Finland)
4. Beech leaves (Austria) – same sample as for the 24th test (sample 3 there)

Sample 1 was collected in Austria (Vienna). **Sample 2** was collected and prepared in Slovenia (Mr. Daniel Žlindra, Slovenian Forestry Institute). **Sample 3** was collected in Finland (John Derome). **Sample 4** was collected in Lower Austria by Ramona Hofer.

Special thanks to all colleagues who collected and prepared samples for this interlaboratory comparison! The further sample preparation (drying and grinding) - if necessary - was done in the BFW laboratory for air pollution monitoring and plant analyses. Before the samples were sent out they were once more homogenized and filled in PE-bags. Homogeneity was tested for these samples by analysing their B, Ca, Cr, Cu, Fe, K, Hg, Mg, Mn, N, Ni, S and Zn contents in eight randomly selected sub samples. No significant variation (Kruskal-Wallis Test - 95% significance level) could be found between the results of eight sub samples, and they were therefore considered to be homogeneous.

2.3 Participants

Table 1 shows the number of countries and laboratories taking part in the interlaboratory comparison test program.

Table 1: Numbers of countries and laboratories since the first interlaboratory comparison test

Interlaboratory Comparison Test	Year	Number of countries	Number of laboratories
1 st	1993/94	21	24
2 nd	1995/96	25	39
3 rd	1997/98	29	51
4 th	1999/00	29	52
5 th	2001/02	29	53
6 th	2003/04	26	46
7 th	2004/05	23	43
8 th	2005/06	30	52
9 th	2006/07	28	53
10 th	2007/08	29	54
11 th	2008/09	28	56
12 th	2009/10	30	56
13 th	2010/11	29	60
14 th	2011/12	28	62
15 th	2012/13	28	61
16 th	2013/14	25	57
17 th	2014/15	25	54
18 th	2015/16	25	53
19 th	2016/17	22	45
20 th	2017/18	23	48
21 st	2018/19	24	52
22 nd	2019/20	23	47
23 rd	2020/21	23	48
24 th	2021/22	25	47
25 th	2022/23	22	43
26 th	2023/24	22	41

Two participating laboratories did not submit any results until the end of the deadline (A49 and A79). With a few exceptions, all other laboratories analysed the complete list of mandatory elements in the 26th Interlaboratory Comparison Test (s. Table 2).

Table 2: Analysed elements from the participant laboratories (green); no results were submitted (grey); red “X”: monitoring samples will be analyzed from the growing season 2023 and these results will be sent to PCC in 2024 (“ICP-Forests laboratory”)

Labcode	N	S	P	Ca	Mg	K	C	Zn	Mn	Fe	Cu	Pb	Cd	B	As	Cr	Co	Hg	Ni
A36																			
A43	X		X	X	X	X			X										
A45	X	X	X	X	X	X	X	X	X	X	X	X							
A47																			
A49																			
A51																			
A57																			
A58																			
A59																			
A60	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
A61																			
A62	X	X	X	X	X	X	X												
A65																			
A79																			
A80																			
A82																			
A85	X	X	X	X	X	X	X												
A86																			
A88																			
F01	X		X	X	X	X													
F02	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	X
F03	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X
F05	X	X	X	X	X	X	X	X	X	X	X	X							
F06	X	X	X	X	X	X	X				X	X	X	X					
F07	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
F08	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
F12	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
F13	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
F14	X	X	X	X		X	X	X	X	X	X	X	X	X	X	X	X	X	X
F15	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
F16	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
F18	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
F19	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X
F21	X	X	X	X	X	X	X												
F24	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				X
F25																			
F26	X		X	X	X	X	X												
F27	X	X	X	X	X	X	X												
F28	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				X
F32	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X				X
F33	X	X	X	X	X	X	X			X	X			X				X	

2.4 Data Evaluation

Only in the case that four replicates above the quantification limits are entered for a sample, its results can be used for calculating an outlier free laboratory mean value. Results below the quantification limit are marked with "<", followed by the quantification limit of the laboratory (e.g. <0.1, see Annex-Results).

The results of this interlaboratory comparison test were evaluated according to the normative DIN 38402-42:2005-09. This method identifies three types of outliers: With the Grubbs-test the four replicates from each laboratory are first checked for outliers between them (type 1 outliers). The second step is to compare the recalculated mean values of each lab with the mean value from all labs as well as with the Grubbs-test for outliers (type 2 outliers). At this point the outlier free total mean value and the outlier free maximum and minimum mean values of all labs can be calculated. At this point, marked type 1 outliers between the outlier-free maximum and minimum mean values are no longer outliers; they are therefore no longer excluded and are included again for the further evaluation of the interlaboratory comparison test. Third, the recalculated standard deviation from the laboratories must be compared with the total standard deviation (Cochran test) to eliminate laboratories with an excessive standard deviation (outlier type 3). In case of detected type 3 outliers, a re-check for type 2 outliers must be carried out. This last step is used to finalize the calculation the outlier-free statistical values.

After calculating the outlier free mean value for each element/sample and the laboratory mean value, the recovery is calculated and compared with the tolerable limits from Tables 3 and 4. Laboratory results that are within these tolerable limits are labelled green (passed the test); outside these limits they are labelled orange (failed the test, see Annex-Results). This type of evaluation was fixed in the Foliar Expert Panel Meetings of As (1994) and Vienna (1997).

Table 3: Tolerable limits for **normal concentrations** in foliage for the mandatory and optional elements

Element	Tolerable deviation from mean in %	Adopted by the Expert Panel Foliage and Litterfall
As	80-120	15 th Meeting - Zagreb 2017
B	80-120	6 th Meeting - Bonn 1999
C	95-105	6 th Meeting - Bonn 1999
Ca	90-110	10 th Meeting - Madrid 2007
Cd	70-130	6 th Meeting - Bonn 1999
Co	75-125	15 th Meeting - Zagreb 2017
Cr	75-125	15 th Meeting - Zagreb 2017
Cu	80-120	8 th Meeting - Prague 2003
Fe	80-120	6 th Meeting - Bonn 1999
Hg	80-120	15 th Meeting - Zagreb 2017
K	90-110	10 th Meeting - Madrid 2007
Mg	90-110	10 th Meeting - Madrid 2007
Mn	85-115	8 th Meeting - Prague 2003
N	90-110	6 th Meeting - Bonn 1999
Ni	80-120	15 th Meeting - Zagreb 2017
P	90-110	10 th Meeting - Madrid 2007
Pb	70-130	6 th Meeting - Bonn 1999
S	85-115	10 th Meeting - Madrid 2007
Zn	85-115	8 th Meeting - Prague 2003

Table 4: Tolerable limits for **low concentrations** for the mandatory and optional elements (e.g. for non-foliage litterfall). The limits were fixed in Hamburg 2009 (11th Meeting of the Expert Panel Foliage and Litterfall) and in Zagreb 2017 (15th Meeting of the Expert Panel Foliage and Litterfall)

Element	Tolerable deviation from mean in %	Applied to concentrations below
As	70-130	50 ng/g
B	70-130	5 µg/g
Ca	85-115	3 mg/g
Co	65-135	0.1 µg/g
Cr	65-135	1 µg/g
Fe	70-130	20 µg/g
Hg	70-130	50 ng/g
K	85-115	1 mg/g
Mg	85-115	0.5 mg/g
Mn	80-120	20 µg/g
N	85-115	5 mg/g
Ni	70-130	1 µg/g
P	85-115	0.5 mg/g
Pb	60-140	0.5 µg/g
S	80-120	0.5 mg/g
Zn	80-120	20 µg/g

If a limit of quantification (LOQ) is entered by a laboratory instead of a measured value, it will be checked first against the maximum acceptable LOQ from Table 5. If it exceeds the maximum acceptable LOQ, the lab will fail (labelled orange) – in case that it is equal or lower it will be checked against the outlier free mean. If a submitted LOQ lies within the tolerable limits associated with the mean of all labs, the lab will pass for this sample of the according parameter (marked in green). If the submitted LOQ exceeds these tolerable limits, the lab fails for this sample (marked in orange). This evaluation approach for LOQ values was defined at the 3rd Meeting of the Heads of the Laboratories in Arcachon (2011).

At very low concentrations, interlaboratory comparison test samples are excluded from evaluation for the elements in question (see Table 5). This procedure is necessary to avoid incorrect qualification results caused by unreliable calculations. Furthermore, in practice there is rarely a need to detect these low concentrations in natural samples, as they do not provide any additional information on the nutrient status (e.g. < 1 µg Cu/g is always a deficiency) or on the pollution impact situation (e.g. < 20 ng Cd/g, < 1 µg Cu/g, < 0.2 µg Pb/g is always not polluted).

Table 5: Maximum acceptable limit of quantification (LOQ) and lowest evaluated interlaboratory sample result fixed in Arcachon 2011 (3rd Meeting of the Heads of the Laboratories) and in Pallanza 2017 (6th Meeting of the Heads of the Laboratories)

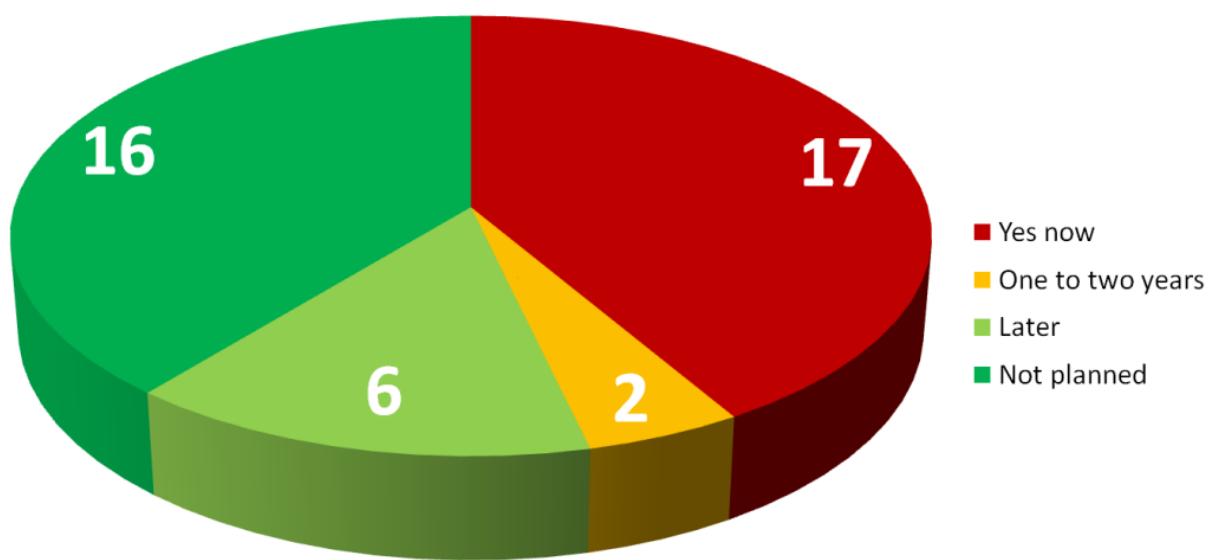
Element	Maximum acceptable limit of quantification	Lowest evaluated result
As	50 ng/g	20 ng/g
B	1 µg/g	-
C	10 g/100g	-
Ca	0.5 mg/g	-
Cd	50 ng/g	20 ng/g
Co	0.1 µg/g	0.05 µg/g
Cr	1 µg/g	0.5 µg/g
Cu	1 µg/g	1 µg/g
Fe	5 µg/g	-
Hg	20 ng/g	10 ng/g
K	0.5 mg/g	-
Mg	0.3 mg/g	-
Mn	5 µg/g	-
N	2 mg/g	-
Ni	1 µg/g	0.5 µg/g
P	0.3 mg/g	-
Pb	0.5 µg/g	0.20 µg/g
S	0.3 mg/g	-
Zn	5 µg/g	-

3 RESULTS

3.1 Main results of the questionnaire

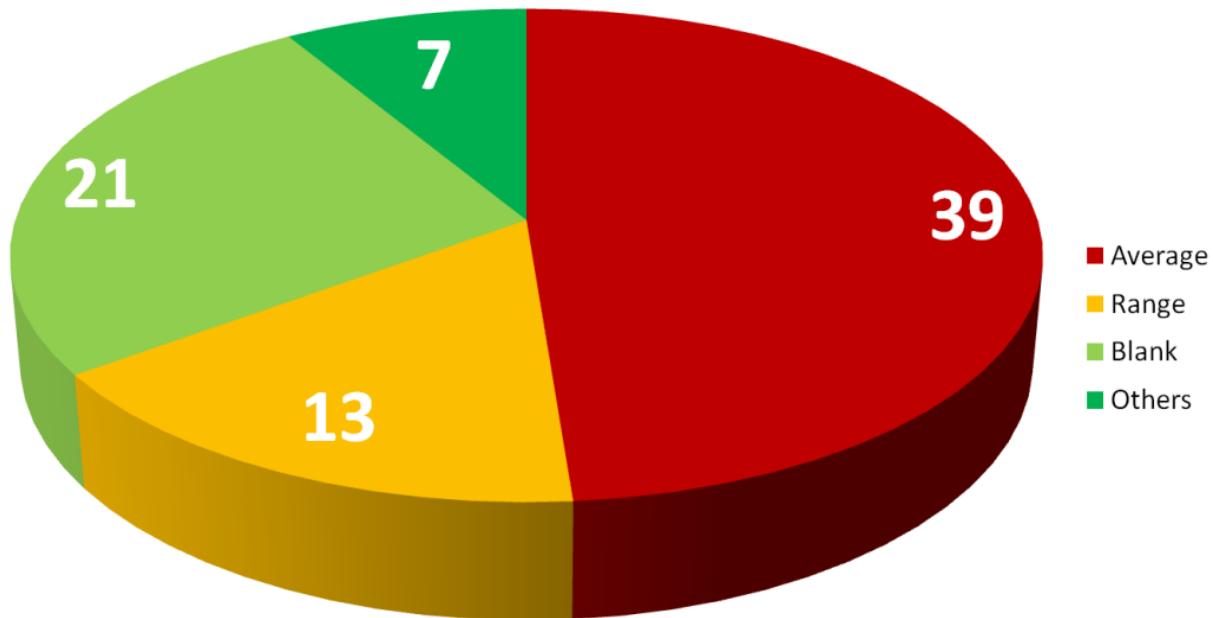
The participating laboratories answered a questionnaire in order to obtain information about the status and changes of their quality control systems and their instrumentation. The first questions dealt with the accreditation status of the participating laboratories. The summarized results are shown in Figure 2.

Figure 2: Accreditation status according EN 17025 (n=41)



46.3% of the participating laboratories are accredited now (19 labs) or plan an accreditation within 1-2 years (2 labs), 14.6% are planning their accreditation later and 39.0% (16 labs) do not plan an accreditation.

The next important question was about the usage of control charts for routine quality control (Hovind et al., 2007). 95.1% of these 41 laboratories have indicated that they are using control charts, and most of them are using average control charts (Figure 3). Two of the 41 laboratories state that they do not use a control chart. Some of the laboratories are using more than one type of control charts (Figure 3).

Figure 3: Types of control charts used in foliar laboratories (multiple answers were possible)

3.2 Results of the 26th Interlaboratory Comparison Test

Table 6 gives an overview about the test samples analysed by the different laboratories and about correct or failed results of these determinations. This evaluation is based on the tolerable limits from Table 3 and Table 4 and on the maximum acceptable limit of quantification (LOQ) from Table 5. A green marked field means all samples are analysed well, a grey marked field means no results were sent from this laboratory till 1st of January 2023. The signs “<” or “>” marked in red mean that results were below or above the tolerable limits.

As stated in the description of Table 5, LOQ's are tested against the maximum acceptable LOQ and then against the lower tolerable limit associated with the mean of all laboratories. If it does not correspond to the maximum permissible LOQ, it is labelled with an "L" (see Table 6).

A further important parameter is the total percentage of correct results per lab, which is calculated from all determinations and if they were correct or not. For the following participants, the percentage of correct results is below 80%, so that QC/QA problems must also be taken into account in their laboratory:

A80 (77.50%), **F24** (75.86%), **A62** (75.00%), **F27** (70.17%) and **A85** (53.57%)

Some accepted results are within the tolerable limits, but the statistical evaluation shows an excessive standard deviation (type 1 or 3 outliers, marked with “a” or “c”, respectively) or a high Vi (> 10%, marked with red colour). This means these labs have e.g. contamination influences or other methodological problems. It should be kept in mind that such errors have a random character and increase the probability of failed determinations in the future. Hence they should be seen as alarm signs when they occur!

Table 6: Results of the 26th Needle/Leaf Interlaboratory Comparison Test – results marked with the limits from Tables 3 and 4 (green = all samples were analysed well; “<” means too low; “>” means too high; grey = no results were submitted) and with the maximum acceptable LOQ from Table 5 (“L” means an LOQ being higher than the maximum acceptable LOQ)



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The calculated outlier-free mean element concentrations for each test sample and the percentage of the non-tolerable laboratory results based on the tolerable limits are provided in Table 7.

Sample 1 had a too low concentration for Cd and sample 3 for Pb, Cr, As and Hg. Consequently, their results were excluded from the evaluation.

All four samples in this test were foliage samples. The concentration ranges for some heavy metals were low. This explains the higher amount of non-tolerable results for these parameters and samples.

Table 7: Mean element concentrations and percentages of non-tolerable results (results evaluated with the tolerable limits for low concentrations are marked in blue colour; samples having too low concentrations that have not been evaluated are marked in grey colour)

Element	Unit	Sample 1 <i>Ash leaves</i>	Sample 2 <i>Oak leaves</i>	Sample 3 <i>Spruce needles</i>	Sample 4 <i>Beech leaves</i>
N	mg/g	27.67	14.97	12.59	23.53
	%	0.00	0.00	0.00	0.00
S	mg/g	3.01	1.32	0.93	1.48
	%	2.94	8.82	14.71	8.82
P	mg/g	1.69	1.76	1.71	1.28
	%	2.78	8.33	8.33	8.33
Ca	mg/g	14.94	16.61	2.38	5.17
	%	8.33	8.33	8.33	11.11
Mg	mg/g	3.65	2.45	1.25	0.79
	%	2.78	8.33	16.67	13.89
K	mg/g	23.69	5.12	5.84	8.89
	%	13.89	2.78	2.78	0.00
C	g/100g	47.23	49.22	52.07	51.60
	%	5.71	5.71	0.00	5.71
Zn	µg/g	14.14	43.19	48.85	22.02
	%	9.68	6.45	6.45	12.90
Mn	µg/g	38.06	354.81	496.03	804.17
	%	12.50	3.13	3.13	6.25
Fe	µg/g	122.89	270.82	42.15	110.02
	%	3.23	3.23	19.35	3.23
Cu	µg/g	11.40	7.82	3.41	5.95
	%	6.67	3.33	10.00	6.67
Pb	µg/g	0.30	0.70	0.06	0.21
	%	18.18	18.18	-	22.73
Cd	ng/g	5.07	158.92	63.10	101.51
	%	-	0.00	4.17	0.00
B	µg/g	39.05	23.12	6.61	12.97
	%	9.52	0.00	14.29	9.52
As	ng/g	126.50	116.02	8.11	27.21
	%	9.09	0.00	-	0.00
Cr	µg/g	0.56	0.94	0.29	0.67
	%	11.11	5.56	-	5.56
Co	µg/g	0.07	0.13	0.17	0.06
	%	0.00	0.00	0.00	0.00
Hg	ng/g	25.95	59.88	9.04	30.94
	%	6.25	18.75	-	12.50
Ni	µg/g	2.23	4.69	3.24	0.78
	%	12.50	4.17	8.33	12.50

3.3 Comparison of the 26th Interlaboratory Comparison Test with former tests

Sample 3 of the 24th Interlaboratory Comparison Test and sample 4 of the 26th Interlaboratory Comparison Test are identical (*Beech leaves - Austria*). For most of the elements the mean values are identical (see Table 8). The well comparable results (determined by the outlier-free evaluation) show that the contents of this sample are stable.

The ringtest is evaluated on the basis of fixed limits (Tables 3 and 4). These tolerable deviations from the mean were updated in Foliage Expert Panel Meetings in Bonn (1999), Prague (2003), Madrid (2007) and Zagreb (2017) and in the 1st Meeting of the Heads of the Laboratories in Hamburg (2009) for some elements. The maximum acceptable limits of quantification (Table 5) were defined in the 3rd Meeting of the Heads of the Laboratories in Arcachon (2011) and in the 6th Meeting of the Heads of the Laboratories in Pallanza (2017). These maximum acceptable limits were applied from the 14th to the 26th test. The changes of the percentages of non-tolerable results from the 11th to the 26th test are accessible in Tables 9a and 9b.

LECO CNS928

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Table 8: Comparison between Sample 3 of the 24th and Sample 4 of the 26th Interlaboratory Comparison Test

Element (Unit)	24 th Interlaboratory Comparison Test 2021/22 (Sample 3) Mean	Number of Labs	26 th Interlaboratory Comparison Test 2023/24 (Sample 4) Mean	Number of Labs
N mg/g	23.58	42	23.53	38
S mg/g	1.49	39	1.48	34
P mg/g	1.28	41	1.28	36
Ca mg/g	5.13	42	5.17	36
Mg mg/g	0.78	42	0.79	36
K mg/g	8.77	42	8.89	36
C g/100g	51.80	39	51.60	35
Zn μg/g	21.81	34	22.02	31
Mn μg/g	785.12	36	804.17	32
Fe μg/g	108.85	34	110.02	31
Cu μg/g	5.97	33	5.95	30
Pb μg/g	0.24	23	0.21	22
Cd ng/g	102.18	23	101.51	24
B μg/g	13.20	22	12.97	21
As ng/g	26.97	12	27.21	11
Cr μg/g	0.72	21	0.67	18
Co μg/g	0.061	17	0.06	14
Hg ng/g	30.78	17	30.94	16
Ni μg/g	0.83	25	0.78	24

Table 9a: Percentage of non tolerable results from the 12th to the 19th test

Element	Tolerable limits normal (low ¹⁾ (± %)	12 th Labtest 2009/2010		13 th Labtest 2010/2011		14 th Labtest 2011/2012		15 th Labtest 2012/2013		16 th Labtest 2013/2014		17 th Labtest 2014/2015		18 th Labtest 2015/2016		19 th Labtest 2016/2017	
		Non tolerable values (%)	Number (%)	Non Number	Number (%)	Non tolerable values (%)	Number (%)	Non tolerable values (%)	Number (%)	Non tolerable values (%)	Number (%)	Non tolerable values (%)	Number (%)	Non tolerable values (%)	Number (%)	Non tolerable values (%)	Number (%)
N	10 (15)	7,6	212	4,9	224	8,9	224 ¹⁾	6,0	216	3,1	196	2,1	192	7,9	164 ¹⁾	4,6	152
S	15 (20)	16,5	200	13,9	208	12,7	220 ¹⁾	13,9	208	14,8	196	9,9	192	6,4	156 ¹⁾	7,4	148
P	10 (15)	13,7	212	7,4	216 ¹⁾	15,9	220 ¹⁾	9,4	224	18,8	208	14,7	204	15,5	168 ¹⁾	15,4	164
Ca	10 (15)	9,7	216	8,0	212	14,7	224 ¹⁾	12,1	224 ¹⁾	16,3	208	17,7	212	9,1	176 ¹⁾	11,3	168 ¹⁾
Mg	10 (15)	14,4	216	5,7	212	19,3	228 ¹⁾	5,9	220	8,8	204	12,3	212	14,2	176 ¹⁾	13,1	168
K	10 (15)	6,0	216	8,5	212	21,0	228 ¹⁾	18,0	228	9,1	208	11,5	208	15,6	180 ¹⁾	16,7	168
C	5	8,5	188	6,3	192	15,4	208	7,7	196	10,0	180	7,8	180	9,5	148	8,1	136
Zn	15 (20)	6,4	172	9,7	176 ¹⁾	4,4	184	5,4	184 ¹⁾	5,6	180 ¹⁾	8,1	172	13,5	148	12,1	132
Mn	15 (20)	2,7	176	4,8	188	6,8	192	0,5	188	8,7	184	3,9	180	6,1	148	8,8	136
Fe	20 (30)	4,8	168	0,0	180	14,1	184	3,7	188	9,4	180	6,5	168	12,2	148	13,3	128
Cu	20	21,3	160	9,1	176	10,3	184	9,1	176	14,5	172	15,7	172	4,2	144	15,2	132
Pb	30 (40)	13,3	120	12,5	112 ¹⁾	15,6	128 ¹⁾	8,6	105 ²⁾	10,7	56 ²⁾	7,8	87 ²⁾	16,0	75 ^{1;2)}	7,7	24 ²⁾
Cd	30	10,7	112	9,5	116	10,0	140	7,1	140	4,8	62 ²⁾	14,3	112	8,0	112	2,1	96
B	20 (30)	5,4	92	3,3	92	12,0	100 ¹⁾	5,0	100	6,3	96	5,0	100	11,9	84 ¹⁾	13,9	72
As¹⁾	20 (30)	-	-	-	-	-	-	-	-	-	-	-	-	19,2	52¹⁾	25,6	39 ^{1;2)}
Co¹⁾	25 (35)	-	-	-	-	-	-	-	-	-	-	-	-	13,2	68¹⁾	4,4	68
Cr¹⁾	25 (35)	-	-	-	-	-	-	-	-	-	-	-	-	10,9	46^{1;2)}	16,3	92 ¹⁾
Hg¹⁾	20 (30)	-	-	-	-	-	-	-	-	-	-	-	-	4,5	44¹⁾	19,6	56 ¹⁾
Ni¹⁾	20 (30)	-	-	-	-	-	-	-	-	-	-	-	-	8,3	96¹⁾	7,6	92

¹⁾ special tolerable limits for low concentrations²⁾ sample/s excluded because of very low concentration

*) Only experimentally evaluated at this stage

Table 9b: Percentage of non tolerable results from the 19th to the 26th test

Element	Tolerable limits (± %)	20 th Labtest 2017/2018		21 st Labtest 2018/2019		22 nd Labtest 2019/2020		23 rd Labtest 2020/2021		24 th Labtest 2021/2022		25 th Labtest 2022/2023		26 th Labtest 2023/2024	
		Non tolerable values (%)	Number (%)												
N	10 (15)	3,7	164 ¹⁾	16,1	180	5,1	156	4,7	172	8,9	168	1,3	156	0,0	152
S	15 (20)	16,7	156 ¹⁾	16,9	172	11,4	140	11,9	160	10,3	156	12,1	140	8,8	136
P	10 (15)	18,3	180 ¹⁾	16,3	184	9,0	156	16,7	168	7,3	164	12,2	148	6,9	144 ¹⁾
Ca	10 (15)	12,0	184 ¹⁾	15,8	184	12,5	160	15,3	176	10,1	168	15,1	152	9,0	144 ¹⁾
Mg	10 (15)	10,9	184	10,1	188	10,6	160	7,4	176	8,3	168	10,5	152	10,4	144
K	10 (15)	14,7	184	16,5	188	12,5	160	11,4	176	10,1	168	3,9	152	4,9	144
C	5	7,9	152	14,3	168	2,9	140	3,8	156	7,7	156	2,8	144	4,3	140
Zn	15 (20)	6,3	144 ¹⁾	5,3	152	10,0	140	9,0	144	6,6	136	4,3	116	8,9	124 ¹⁾
Mn	15 (20)	10,5	152 ¹⁾	3,2	156	11,5	148	9,2	152 ¹⁾	2,8	144	4,0	124	6,3	128
Fe	20 (30)	4,2	144	5,0	140	6,9	144	8,1	136	2,9	136	5,2	116	7,3	124
Cu	20	8,8	136	6,8	148	12,5	136	7,9	140	6,8	132	7,1	112	6,7	120
Pb	30 (40)	8,3	24 ²⁾	7,1	84 ^{1);2)}	22,7	75 ^{1);2)}	16,7	78 ^{1);2)}	4,3	46 ^{1);2)}	3,6	84 ^{1);2)}	19,7	66 ^{1);2)}
Cd	30	2,7	75 ²⁾	10,3	116	14,6	48 ²⁾	8,0	50 ²⁾	0,0	92	4,2	96	1,4	72 ²⁾
B	20 (30)	6,8	88	4,3	92	13,1	84	10,9	92	11,4	88 ¹⁾	5,0	80	8,3	84
As	20 (30)	48,7	39 ^{1);2)}	19,6	56 ¹⁾	37,5	48 ¹⁾	27,1	48 ¹⁾	11,1	36 ^{1);2)}	9,6	52 ^{1);2)}	3,0	33 ^{1);2)}
Co	25 (35)	11,8	51 ²⁾	20,6	63 ²⁾	21,9	48 ^{1);2)}	19,0	42 ^{1);2)}	7,4	68 ¹⁾	5,4	56 ²⁾	0,0	56 ¹⁾
Cr	25 (35)	15,2	92	21,7	92 ¹⁾	6,3	32 ^{1);2)}	7,2	69 ²⁾	9,5	84 ¹⁾	7,5	80 ¹⁾	7,4	54 ^{1);2)}
Hg	20 (30)	0,0	36 ^{1);2)}	6,3	48 ^{1);2)}	9,5	42 ^{1);2)}	8,3	60 ¹⁾	9,8	51 ^{1);2)}	11,5	52 ¹⁾	12,5	48 ^{1);2)}
Ni	20 (30)	16,3	92 ¹⁾	9,0	100	18,0	100 ¹⁾	13,0	100 ¹⁾	3,0	100 ¹⁾	4,3	92	9,4	96 ¹⁾

¹⁾ special tolerable limits for low concentrations ²⁾ samples excluded because of very low concentration

3.4 Evaluation by element

3.4.1 Nitrogen

In comparison with the last Interlaboratory Comparison Test the percentage of non-tolerable results of all laboratories decreased to the best possible value this time (1.3% → 0.0%). No laboratory failed with three or four samples; hence no requalification will be necessary for this element.

3.4.2 Sulphur

In comparison with the last Interlaboratory Comparison Test the percentage of non-tolerable results of all laboratories decreased (12.1% → 8.8%). Two laboratories failed in analyzing three out of four samples correctly (A62 and A85).

A requalification is obligatory for the *ICP-Forsts laboratories A62 and A85*.

3.4.3 Phosphorus

In comparison with the last Interlaboratory Comparison Tests the percentage of non-tolerable results decreased (25th Labtest: 12.2% → 26th Labtest: 6.9%). Three laboratories failed in analyzing three (A85, A51) out of four samples correctly.

A requalification is obligatory for the *ICP-Forsts laboratory A85*.

3.4.4 Calcium

In comparison with the last Interlaboratory Comparison Tests the percentage of non-tolerable results remains on a comparably high level with a slight recent decrease compared to the last test this time (24th Labtest: 10.1% → 25th Labtest: 15.1% → 26th Labtest: 9.0%). Sample 3 had a lower calcium concentration than the limit of the lower concentration range. One laboratory failed in analyzing all four (F27) correctly.

A requalification is obligatory for the *ICP-Forsts laboratory F27*.

3.4.5 Magnesium

In comparison with the last test, the percentage of non-tolerable results remained almost exactly the same (10.5% → 10.4%). One laboratory failed in analyzing all four (A85) samples correctly.

A requalification is obligatory for the *ICP-Forsts laboratory A85*.

3.4.6 Potassium

In comparison with the last test the percentage of non-tolerable results remained nearly unchanged (3.9% → 4.9%). No laboratory failed with three or four samples; hence no requalification will be necessary for this element.

3.4.7 Carbon

In comparison with the last Interlaboratory Comparison Test the percentage of non-tolerable results increased slightly (2.8% → 4.3%). Laboratory A47 failed in analyzing three out of four samples correctly. When using an elemental-analyzer, constant percentages of recovery of all four samples might indicate a calibration error.

3.4.8 Zinc

In comparison with the last Interlaboratory Comparison Test the percentage of non-tolerable results increased slightly (4.3% → 8.9%). Sample 1 had a lower zinc concentration than the limit of the lower concentration range. Two laboratories failed with all four (F24) or three out of four samples (A47).

A requalification is obligatory for the *ICP-Forsts laboratory F24*.

3.4.9 Manganese

In comparison with the last Interlaboratory Comparison Test the percentage of non-tolerable results is quite constant (4.0% → 6.3%). Laboratory A80 failed in analyzing all four samples correctly.

3.4.10 Iron

In comparison with the last Interlaboratory Comparison Test the percentage of non-tolerable results increased slightly (5.2% → 7.3%). Laboratory A80 failed in analyzing three out of four samples correctly.

3.4.11 Copper

In comparison with the last test the percentage of non-tolerable results is quite constant (7.1% → 6.7%). Laboratory F08 failed in analyzing three out of four samples correctly.

A requalification is obligatory for the *ICP-Forsts laboratory F08*.

3.4.12 Lead

Sample 3 had to be excluded from the ringtest evaluation, because of a too low lead concentration. In comparison with the last test the percentage of non-tolerable results increased distinctly (3.6% → 19.7%). Samples 1 and 4 showed a lower lead concentration than the limit of the lower concentration range (< 0.5 µg/g). Three laboratories failed with all three of the remaining samples (F27, F24 and F19); one laboratory failed in two out of three samples (F02). Laboratory F19 failed because of a too high limit of quantification (LOQ).

A requalification is obligatory for the *ICP-Forsts laboratory F19*.

The best analytical choice to analyze these low concentrations is the ICP-MS method. This is also reflected in the fact that none of the laboratories using this method have submitted incorrect results for this parameter in this test.

3.4.13 Cadmium

Sample 1 had to be excluded from the ringtest evaluation, because of a too low concentration. In comparison with the last Interlaboratory Comparison Tests the percentage of non-tolerable results decreased slightly (4.2% → 1.4%). No laboratory failed with three or four samples; hence no requalification will be necessary for this element.

3.4.14 Boron

In comparison with the last test the percentage of non-tolerable results is slightly increased (5.0% → 8.3%). No laboratory failed with three or four samples; hence no requalification will be necessary for this element.

3.4.15 Arsenic

Sample 3 had to be excluded from the ringtest evaluation, because of its too low content. Sample 4 had a lower arsenic concentration than the limit of the lower concentration range (< 50 ng/g). In comparison with the last test the percentage of non-tolerable results is quite constant (9.6% → 8.3%). No laboratory failed with three or four samples; hence no requalification will be necessary for this element.

3.4.16 Chromium

In comparison with the last Interlaboratory Comparison Test the percentage of non-tolerable results is almost identical (7.5% → 7.4%). Sample 3 had to be excluded from the ringtest evaluation, because of its too low content. Samples 1, 2 and 4 had a lower chromium concentration than the limit of the lower concentration range (< 1 µg/g). Laboratory F27 failed in analyzing two out of three evaluated samples correctly.

3.4.17 Cobalt

Samples 1 and 4 had a lower concentration than the limit of the lower concentration range. In comparison with the last Interlaboratory Comparison Tests the percentage of non-tolerable results decreased to the best possible value (5.4% → 0.0%). No laboratory failed with three or four samples; hence no requalification will be necessary for this element.

3.4.18 Mercury

In comparison with the last Interlaboratory Comparison Tests the percentage of non-tolerable results was quite constant (11.5% → 12.5%). Sample 3 had to be excluded from the ringtest evaluation, because of its too low mercury-content. Samples 1 and 4 had a lower mercury concentration than the limit of the lower concentration range (< 50 ng/g). Laboratory A47 failed with all three evaluated samples.

3.4.19 Nickel

In comparison with the last Interlaboratory Comparison Tests the percentage of non-tolerable results is quite constant (3.0% → 4.3%). Sample 4 had a lower nickel concentration than the limit of the lower concentration range. Laboratory F27 failed in analyzing all four samples correctly.

4 CONCLUSIONS

41 laboratories in 22 countries participated in the 26th Needle/Leaf Interlaboratory Test; 39 laboratories submitted their results in time.

A new system for qualification and re-qualification started with the 11th test in 2009. This system was enlarged after the manual update in 2010 to all ICP-Forests partners (see Fürst et al. 2020, König et al. 2013, Rautio et al. 2013 and 2020, Ukonmaanaho et al. 2020). With the ring test report, each participant received a qualification report which can be downloaded from the webpage (https://bfw.ac.at/ws/ring_nadel.login). It has been decided to qualify the results of each parameter separately. A laboratory is qualified if 50% or more (generally two, three or all four samples) of the results for this parameter for all the samples of the ring test are within the tolerable limits. A qualification is mandatory for all ICP-Forests laboratories if monitoring results (foliage, litterfall, ground vegetation) for the growing season 2023 are to be submitted to the PCC.

In case of an unsuccessful participation, a re-qualification is foreseen (see: <https://bfw.ac.at/rz/bfwcms2.web?dok=3002>). Only a successful participation in the following ringtest for the element(s) which had to be requalified can successfully complete the re-qualification.

If an ICP-Forests laboratory did not qualify and did not make efforts to improve the data quality, ICP Forests PCC will send a letter to the National Focal Centre and inform them about the consequence that their data possibly cannot be used for evaluations on a European level.

The usage of maximum acceptable limits of quantification (LOQ) has been included since the 14th Interlaboratory Test. These limits are needed, because many laboratories are using multi element methods (mostly ICP-AES) with higher LOQs for some elements. But for evaluation and classification of the monitoring samples *real* measured results and lower LOQ are sometimes needed. The Working Group QA/QC in Laboratories received a task to fix this problem from the Expert Panel Foliage and Litterfall (12th Meeting - Tallinn 2011). Maximum acceptable LOQs for mandatory and optional parameters for foliage, litterfall and ground vegetation were discussed and accepted in the 3rd Meeting of the Heads of the Laboratories (Arcachon 2011) and in the 6th Meeting of the Heads of the Laboratories (Pallanza 2017).

This problem could be reduced – three laboratories submitted LOQs higher than the maximum acceptable LOQs (**A51** for Fe and B, **A65** for Ni and **F19** for Pb). Only one out of these laboratories labelled its data for submission to the PCC (F19).

In case of very low concentrations in the test samples, results of these samples were excluded from the evaluation (this was the case for **sample 1**: Cd and **sample 3**: Pb, As, Cr and Hg). Excluding these samples was necessary to avoid wrong qualification results caused by calculations which are then too unreliable. Furthermore, there is seldom a practical need to detect these low concentrations in natural samples, because it gives no additional information of the nutrient status or about the pollution impact situation.

The following participating laboratories with a percentage of correct results below 80% have severe QC/QA-problems, a miscalculation of the results and/or methodical problems:

A80 (77.50%), **F24** (75.86%), **A62** (75.00%), **F27** (70.18%) and **A85** (53.57%)

Some of the *ICP-Forests laboratories* failed and a re-qualification **is obligatory** for certain parameters (**A62**: S; **A85**: S, P, Mg; **F08**: Cu; **F19**: Pb; **F24**: Zn and **F27**: Ca). These *ICP-Forests laboratories* have to check and re-validate their methods or employ better applicable methods. FFCC offers ringtest materials from previous tests which were evaluated with outlier-free means as well, if some of these materials are needed for this purpose (see: <https://bfw.ac.at/rz/bfwcms2.web?dok=5146>).

No laboratory failed this test with the same parameters as the last test. **It can be concluded that all laboratories that submitted results for the same parameters as those that failed the last test have solved their QA/QC or methodological problems.**

All laboratories are invited to take part in the re-qualification program that starts up from now till 1st of September 2024 (see details to the procedure and the needed documents: <https://bfw.ac.at/rz/bfwcms2.web?dok=7830>). Deadline for submission of the resubmission results is 2nd of August 2024.

As far as the most frequently used analytical methods are concerned, the microwave digestion method is the most common digestion method. With this respect, a clear recommendation for ICP-AES as determination method can be given. Where ICP-AES is not sensitive enough, ICP-AES with ultrasonic nebulizer or better ICP-MS are recommended. For determinations of nitrogen and carbon, element analyzers are the best choice.

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Forest Research

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Method Codes – Pretreatment (P)

Extraction methods

- PA06 Extraction with diluted HNO₃
- PA99 Other extraction method

Digestion methods (open system)

- PB02 Open digestion with H₂SO₄/H₂O₂
- PB03 Open digestion with HNO₃
- PB04 Open digestion with HNO₃ /H₂SO₄
- PB05 Open digestion with HNO₃/H₂O₂
- PB06 Open digestion with HNO₃/HClO₄
- PB07 Kjeldahl H₂SO₄ with Se or Cu catalyst
- PB08 Modified Kjeldahl H₂SO₄ with Ti/Cu catalyst
- PB99 Other digestion method (open system)

Pressure digestion methods

- PC01 Pressure digestion HNO₃
- PC02 Pressure digestion HNO₃/H₂O₂
- PC03 Pressure digestion HNO₃/HF (total digestion)
- PC99 Other pressure digestion method

Microwave pressure digestion methods

- PD01 Microwave pressure digestion HNO₃
- PD02 Microwave pressure digestion HNO₃/H₂O₂
- PD03 Microwave pressure digestion HNO₃/H₂O₂/HCl
- PD04 Microwave digestion HNO₃/HClO₄
- PD05 Microwave pressure digestion HNO₃/HF (total digestion)
- PD99 Other microwave pressure digestion method

Dry ashing digestion methods

- PE01 Oxygen ashing (Schöniger)
- PE99 Other dry ashing method

Other methods

- PZ01 Material melted and formed (tablet) for XRF methods
- PZ02 Material pressed (pellet) for XRF methods
- PZ98 No pretreatment
- PZ99 Pretreatment method not in this list

Method Codes – Determination (D)

Element analyzer

DA01	Macro Elemental-analyzers for C, N or S for solids (Sample > 100mg)
DA02	Micro Elemental-analyzers for C, N or S for solids (Sample ≤ 100mg) with an extra milling step
DA05	Hg-Analyzer
DA99	Other Element analyzer method

Atomic Absorption or Emission Spectroscopy

DB01	AAS-flame technique (C ₂ H ₂ /Air)
DB02	AAS-flame technique (C ₂ H ₂ /N ₂ O)
DB03	AAS-cold vapor technique
DB04	AAS-hydride technique
DB05	AAS-flameless (electrothermal technique)
DB06	AES-Flame technique (Flame photometry)
DB07	AFS-hydride-technique
DB08	ICP-AES without Ultrasonic nebulisation
DB09	ICP-AES with Ultrasonic nebulisation
DB10	ICP-MS
DB99	Other Atomic Absorption or Emission Spectroscopy method

Physical techniques

DD01	X-ray-energy dispersive
DD02	X-ray-wavelength dispersive
DD99	Other physical technique

UV-VIS Spectrophotometry techniques

DE01	UV-VIS-spectrophotometry-technique
DE03	Continuous flow UV-VIS-spectrophotometry-technique
DE05	Flow injection UV-VIS-spectrophotometry-technique
DE99	Other UV-VIS Spectrophotometry technique

Electrochemical methods

DF03	Ion selective electrodes (except pH-Electrodes)
DF08	Other potentiometric titration
DF99	Other electrochemical method

Other methods

DZ02	N-Determination (after Kjeldahl digestion)
DZ99	Detection method not in this list

List of abbreviations

No.	Number of results ordered by Lab. mean
Lab. Code	Code of the laboratory / Laboratories that analyse level II samples are marked with x
P	Code for pre-treatment method (s. method code pre-treatment)
D	Code for determination method (s. method code determination)
Lab. Mean	Mean of the results of each laboratory without outliers type 1
n	Number of all results from all laboratories without outliers type 1, 2, 3
I	Number of all laboratories without outliers type 2, 3
Mean	Total mean value from all results without outliers type 1, 2, 3
s _i	Standard deviation from each laboratory without outliers type 1
s _r	Mean Standard deviation for all laboratories without outliers type 1, 2, 3
V _i	s _i *100/Lab. Mean (marked in red if >10%)
CV _r	s _r *100/Mean
s _R	Standard deviation from all results without outliers
CV _R	s _R *100/Mean
Recovery %	Lab.mean * 100/Mean
a	Outlier type 1
b	Outlier type 2
c	Outlier type 3
*	Non-tolerable mean value from a laboratory (see Tables 3 & 4)
**	Higher than the maximum acceptable limit of quantification (see Table 5)
LOQ	Limit of quantification

Annex - Results

Mandatory parameters (N, S, P, Ca, Mg, K, C)

Optional parameters (Zn, Mn, Fe, Cu, Pb, Cd, B, As, Cr, Co, Hg, Ni)

Additional parameters

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: N Sample: 1

Unit: mg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		Lab.mean	V_i		
1	A59	PZ98	DA02	25,98	25,97	26,00	26,03	4	26,00		0,03	93,95
2	A36	PB07	DZ02	25,83	25,83	26,36	26,36	4	26,10		0,31	94,31
3	A57	PZ98	DA01	26,10	26,17	25,85a	26,17	3	26,15		0,04	94,50
4	F33x	PZ98	DA02	27,57	26,30	25,98	26,20	0	26,51	C	0,72	95,82
5	A88	PB07	DZ02	26,75	27,30	26,85	26,95	4	26,96		0,24	97,45
6	F18x	PB07	DZ02	27,10	26,90	27,00	26,90	4	26,98		0,10	97,49
7	F01x	PB07	DZ02	27,30	27,00	27,00	26,94	4	27,06		0,16	97,79
8	F21x	PZ98	DA01	27,17	27,20	27,24	26,97	4	27,15		0,12	98,11
9	F25	PZ98	DA01	27,41	27,29	27,09	27,12	4	27,23		0,15	98,41
10	A58	PZ98	DA02	27,20	27,20	27,30	27,30	4	27,25		0,06	98,49
11	F02x	PZ98	DA01	27,40	27,29	27,29	27,18	4	27,29		0,09	98,63
12	A86	PZ98	DA01	27,20	27,50	27,40	27,10	4	27,30		0,18	98,67
13	A65	PZ98	DA02	26,89	27,61	27,53	27,23	4	27,32		0,33	98,72
14	F05x	PZ98	DA01	27,40	27,30	27,30	27,30	4	27,33		0,05	98,76
15	A61	PZ98	DA02	27,07	27,57	27,50	27,62	4	27,44		0,25	99,17
16	F14x	PZ98	DA01	27,60	27,30	27,70	27,60	4	27,55		0,17	99,57
17	F19x	PZ98	DA01	27,60	27,60	27,60	27,60	4	27,60		0,00	99,75
18	F03x	PZ98	DA01	27,75	27,83	27,70	27,21	4	27,62		0,28	99,83
19	F12x	PZ98	DA02	28,00	27,30	27,50	27,80	4	27,65		0,31	99,93
20	F07x	PZ98	DA01	27,40	27,60	27,65	28,12	4	27,69		0,31	100,09
21	F06x	PZ98	DA02	27,64	27,55	28,11	27,81	4	27,78		0,25	100,39
22	F28x	PZ98	DA02	28,00	27,50	27,90	28,00	4	27,85		0,24	100,66
23	A47	PZ98	DA02	27,50	27,80	28,10	28,30	4	27,93		0,35	100,93
24	F26x	PB08	DZ02	27,92	27,92	27,93	27,94	4	27,93		0,01	100,94
25	F27x	PZ98	DA01	28,09	27,86	27,99	28,02	4	27,99		0,10	101,16
26	A51	PZ98	DA02	27,50	28,10	28,10	28,30	4	28,00		0,35	101,20
27	A62x	PZ98	DA01	28,50	28,00	27,90	27,70	4	28,03		0,34	101,29
28	F13x	PZ98	DA01	27,70	27,80	28,30	28,30	4	28,03		0,32	101,29
29	A43x	PB08	DZ02	28,31	28,31	27,54	28,05	4	28,05		0,36	101,39
30	F15x	PZ98	DA01	28,22	28,04	28,00	28,05	4	28,08		0,10	101,48
31	A85x	PZ98	DA01	28,08	28,22	27,99	28,28	4	28,14		0,13	101,71
32	A45x	PZ98	DA02	28,10	28,10	28,30	28,20	4	28,18		0,10	101,83
33	F24x	PZ98	DA02	28,00	28,10	28,80	28,30	4	28,30		0,36	102,28
34	F08x	PZ98	DA01	28,89	28,87	28,11	28,13	4	28,50		0,44	103,00
35	A82	PZ98	DA02	28,90	27,75	29,25	28,30	4	28,55		0,66	103,19
36	F16x	PZ98	DA02	28,67	28,31	28,79	28,51	4	28,57		0,21	103,26
37	F32x	PZ98	DA01	28,90	29,00	28,70	28,80	4	28,85		0,13	104,27
38	A60x	PZ98	DA02	29,42	29,37	28,67	28,47	4	28,98		0,48	104,75
39												
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49												
50												
51												
52												
53												
54												
55												

* = non tolerable mean because more than +/-

n Mean S_r CV_r
 all labs 147 27,67 0,218 0,790
 10 % from the mean

I S_R CV_R
 37 0,696 2,515

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: N Sample: 2

Unit: mg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		Lab.mean	V_i		
1	A59	PZ98	DA02	13,46	13,55	13,44	13,61	4	13,52		0,08	90,31
2	F25	PZ98	DA01	14,38	13,65	13,73	14,55	4	14,08		0,45	94,07
3	A58	PZ98	DA02	14,09	14,05	14,20	14,30	4	14,16		0,11	94,62
4	A36	PB07	DZ02	14,42	14,42	14,21	13,99	4	14,26		0,21	95,29
5	A62x	PZ98	DA01	15,50	14,60	13,50	13,80	4	14,35		0,90	95,89
6	F01x	PB07	DZ02	14,47	14,16	14,10	14,71	4	14,36		0,28	95,95
7	A57	PZ98	DA01	14,27	14,67	14,26	14,52	4	14,43		0,20	96,42
8	F28x	PZ98	DA02	14,30	14,50	14,40	14,60	4	14,45		0,13	96,56
9	F18x	PB07	DZ02	14,40	14,40	14,60	14,50	4	14,48		0,10	96,72
10	A65	PZ98	DA02	14,63	13,92	13,78	15,66	4	14,50		0,86	96,87
11	A61	PZ98	DA02	14,49	14,67	14,34	14,78	4	14,57		0,19	97,36
12	F14x	PZ98	DA01	14,40	14,80	15,00	14,20	4	14,60		0,37	97,56
13	F26x	PB08	DZ02	14,66	14,67	14,66	14,68	4	14,67	c	0,01	98,01
14	F33x	PZ98	DA02	13,41	15,10	13,73	16,48	0	14,68		1,41	98,09
15	A88	PB07	DZ02	14,54	14,64	15,15	14,74	4	14,77		0,27	98,68
16	F07x	PZ98	DA01	14,40	14,42	14,97	15,30	4	14,77		0,44	98,70
17	F19x	PZ98	DA01	14,80	14,80	14,80	14,80	4	14,80		0,00	98,90
18	F15x	PZ98	DA01	14,95	14,82	14,89	14,63	4	14,82		0,14	99,05
19	F06x	PZ98	DA02	15,65	14,17	15,02	14,61	4	14,86		0,63	99,31
20	F21x	PZ98	DA01	14,98	14,94	15,04	14,81	4	14,94		0,10	99,85
21	F02x	PZ98	DA01	15,04	14,74	15,03	15,00	4	14,95		0,14	99,91
22	F12x	PZ98	DA02	15,10	14,80	15,20	15,00	4	15,03		0,17	100,40
23	A86	PZ98	DA01	15,20	15,00	15,00	15,10	4	15,08		0,10	100,73
24	F03x	PZ98	DA01	15,35	15,24	14,85	14,88	4	15,08		0,25	100,77
25	A45x	PZ98	DA02	15,30	14,90	15,30	15,10	4	15,15		0,19	101,23
26	F05x	PZ98	DA01	15,30	15,30	15,20	15,30	4	15,28		0,05	102,07
27	F27x	PZ98	DA01	15,34	15,23	15,61	15,13	4	15,33		0,21	102,42
28	A60x	PZ98	DA02	15,61	15,40	15,41	15,33	4	15,44		0,12	103,15
29	F16x	PZ98	DA02	15,34	15,42	15,58	15,43	4	15,44		0,10	103,19
30	A85x	PZ98	DA01	15,78	15,71	15,29	15,39	4	15,54		0,24	103,86
31	A43x	PB08	DZ02	15,50	15,54	15,85	15,39	4	15,57		0,20	104,04
32	F24x	PZ98	DA02	15,40	15,50	15,90	15,60	4	15,60		0,22	104,24
33	A47	PZ98	DA02	16,10	15,10	15,00	16,50	4	15,68		0,74	104,74
34	A51	PZ98	DA02	14,80	15,20	16,00	16,90	4	15,73		0,93	105,08
35	F32x	PZ98	DA01	15,60	15,70	16,00	15,70	4	15,75		0,17	105,24
36	F08x	PZ98	DA01	16,09	15,82	15,85	15,50	4	15,81		0,24	105,67
37	F13x	PZ98	DA01	15,90	16,00	16,00	15,80	4	15,93		0,10	106,41
38	A82	PZ98	DA02	15,80	16,45	15,95	15,70	4	15,98		0,33	106,75
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52												
53												
54												
55												

* = non tolerable mean because more than +/-

n Mean S_r CV_r
 all labs 148 14,97 0,269 1,798
 10 % from the mean

I S_R CV_R
 37 0,589 3,939

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: N

Sample: 3

Unit: mg/g

* = non tolerable mean because more than +/-

10 % from the mean

10 % from the mean

s_r CV_r
0,145 **1,155**

1

S_R CV_R
0,470 **3,737**

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: N Sample: 4

Unit: mg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		b	V_i		
1	F14x	PZ98	DA01	23,80	20,20	21,10	21,30	0	21,60	b	1,54	91,80
2	A59	PZ98	DA02	21,80	21,84	21,75	21,71	4	21,78		0,06	92,54
3	A36	PB07	DZ02	22,57	22,47	22,36	21,94	4	22,34		0,28	94,92
4	A57	PZ98	DA01	22,18	22,78	22,16	22,55	4	22,42		0,30	95,28
5	F01x	PB07	DZ02	22,84	22,98	22,66	22,72	4	22,80		0,14	96,89
6	A65	PZ98	DA02	22,52	22,39	23,54	23,18	4	22,91		0,55	97,36
7	A43x	PB08	DZ02	23,68	22,79	22,49	22,99	4	22,99		0,51	97,70
8	F26x	PB08	DZ02	23,06	23,04	23,06	23,05	4	23,05		0,01	97,97
9	F21x	PZ98	DA01	23,18	23,10	23,02	23,28	4	23,15		0,11	98,37
10	A61	PZ98	DA02	23,20	22,62	23,14	23,65	4	23,15		0,42	98,40
11	A86	PZ98	DA01	23,20	23,40	23,30	23,00	4	23,23		0,17	98,71
12	F25	PZ98	DA01	23,38	23,30	23,23	23,12	4	23,26		0,11	98,85
13	F05x	PZ98	DA01	23,30	23,30	23,30	23,30	4	23,30		0,00	99,03
14	F02x	PZ98	DA01	23,38	23,43	23,19	23,36	4	23,34		0,10	99,20
15	F12x	PZ98	DA02	23,20	23,00	23,60	23,60	4	23,35		0,30	99,24
16	F18x	PB07	DZ02	23,40	23,30	23,40	23,40	4	23,38		0,05	99,34
17	F33x	PZ98	DA02	23,03	22,82	23,55	24,61	4	23,50		0,80	99,89
18	A88	PB07	DZ02	23,49	22,99	24,09	23,49	4	23,52		0,45	99,94
19	A45x	PZ98	DA02	23,20	23,70	23,60	23,60	4	23,53		0,22	99,98
20	A58	PZ98	DA02	23,50	23,60	23,60	23,60	4	23,58		0,05	100,19
21	F28x	PZ98	DA02	23,50	23,40	23,70	23,80	4	23,60		0,18	100,30
22	F19x	PZ98	DA01	23,60	23,60	23,60	23,60	4	23,60		0,00	100,30
23	F07x	PZ98	DA01	23,80	23,37	23,75	23,52	4	23,61		0,20	100,35
24	A62x	PZ98	DA01	23,80	23,80	23,50	23,40	4	23,63		0,21	100,41
25	F24x	PZ98	DA02	23,30	23,80	24,10	23,70	4	23,73		0,33	100,83
26	F16x	PZ98	DA02	24,11	24,35	22,93	23,66	4	23,76		0,62	100,99
27	F15x	PZ98	DA01	23,69	23,82	23,77	23,82	4	23,78		0,06	101,04
28	F13x	PZ98	DA01	24,10	23,70	23,90	23,50	4	23,80		0,26	101,15
29	F03x	PZ98	DA01	23,94	23,94	23,83	23,71	4	23,86		0,11	101,38
30	F27x	PZ98	DA01	23,98	23,92	23,76	23,89	4	23,89		0,09	101,52
31	F08x	PZ98	DA01	24,30	24,34	23,40	23,60	4	23,91		0,48	101,62
32	F06x	PZ98	DA02	23,86	23,83	24,27	24,58	4	24,14		0,36	102,57
33	A51	PZ98	DA02	23,20	24,30	24,70	24,60	4	24,20		0,69	102,85
34	A85x	PZ98	DA01	24,22	24,17	24,32	24,55	4	24,32		0,17	103,34
35	A47	PZ98	DA02	24,60	24,30	24,60	24,20	4	24,43		0,21	103,81
36	A82	PZ98	DA02	24,85	24,70	24,15	24,40	4	24,53		0,31	104,23
37	F32x	PZ98	DA01	24,70	24,60	25,00	24,10	4	24,60		0,37	104,55
38	A60x	PZ98	DA02	24,14	24,66	24,54	25,43	4	24,69		0,54	104,94
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* = non tolerable mean because more than +/-

n Mean S_r CV_r
 all labs 148 23,53 0,265 1,128
 10 % from the mean

I S_R CV_R
 37 0,627 2,664

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: S Sample: 1

Unit: mg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		b	c		
1	A62x	PZ98	DA01	2,26	2,21	2,36	2,32	0	2,29	*	0,07	75,94
2	A85x	PZ98	DA01	2,46	2,63	2,65	2,88	0	2,66	c	0,17	88,14
3	F19x	PD02	DB08	2,76	2,76	2,76	2,76	4	2,76		0,00	91,63
4	F27x	PZ98	DA01	2,79	2,72	2,80	2,80	4	2,78		0,04	92,29
5	A58	PZ98	DA02	2,78	2,81	2,81	2,76	4	2,79		0,02	92,62
6	A82	PD01	DB08	2,82	2,85	2,81	2,81	4	2,82		0,02	93,66
7	A57	PZ02	DD02	2,85	2,82	2,80	2,86	4	2,83		0,03	94,03
8	A88	PZ98	DA01	2,91	3,06	2,77	2,66	0	2,85	c	0,17	94,54
9	A36	PD02	DB08	2,90	2,91	2,78	2,88	4	2,87		0,06	95,20
10	A59	PC01	DB08	2,92	2,89	2,92	2,93	4	2,91		0,01	96,72
11	F07x	PD99	DB08	2,91	2,92	2,94	2,88	4	2,91		0,03	96,77
12	F28x	PZ98	DA02	2,88	2,86	2,99	2,96	4	2,92		0,06	97,02
13	F02x	PZ98	DA01	2,95	2,91	2,95	2,91	4	2,93		0,02	97,27
14	F25	PB06	DB08	2,97	3,01	2,93	2,98	4	2,97		0,03	98,68
15	A45x	PB99	DB08	2,94	2,96	3,00	3,01	4	2,98		0,03	98,85
16	F18x	PD99	DB08	2,96	3,00	3,00	3,01	4	2,99		0,02	99,35
17	F32x	PD01	DB08	2,99	3,00	2,99	2,99	4	2,99		0,00	99,35
18	F24x	PD01	DB99	3,00	3,16	2,95	2,96	4	3,02		0,10	100,18
19	F05x	PZ98	DA01	3,04	3,04	3,05	3,04	4	3,04		0,00	101,01
20	F08x	PB99	DB08	2,96	3,06	3,08	3,09	4	3,05		0,06	101,18
21	F14x	PC01	DB08	3,05	3,04	3,06	3,05	4	3,05		0,01	101,26
22	A86	PZ98	DA01	3,02	3,08	3,04	3,07	4	3,05		0,03	101,34
23	F21x	PZ98	DA01	3,02	3,12	3,06	3,08	4	3,07		0,04	101,92
24	F12x	PC01	DB08	3,01	3,09	3,11	3,10	4	3,08		0,05	102,23
25	F15x	PC01	DB08	3,07	3,11	3,12	3,07	4	3,09		0,03	102,67
26	A47	PD01	DB08	3,08	3,06	3,14	3,15	4	3,11		0,04	103,16
27	F16x	PC01	DB08	3,05	3,12	3,11	3,17	4	3,11		0,05	103,30
28	F03x	PD02	DB08	3,19	3,15	3,04	3,11	4	3,12		0,06	103,64
29	F33x	PD01	DB10	2,83	3,19	3,22	3,37	4	3,15		0,23	104,66
30	F13x	PD01	DB08	3,16	3,24	3,14	3,19	4	3,18		0,04	105,65
31	F06x	PD02	DB08	3,19	3,14	3,20	3,21	4	3,19		0,03	105,74
32	A51	PD02	DB08	3,17	3,20	3,19	3,21	4	3,19		0,02	105,99
33	A65	PD01	DB08	3,12	3,30	3,22	3,16	4	3,20		0,08	106,23
34	A60x	PD01	DB10	3,20	3,14	3,26	3,22	4	3,21		0,05	106,41
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* = non tolerable mean because more than +/-

n Mean s_r CV_r
 all labs 124 3,01 0,042 1,401
 15 % from the mean

I s_R CV_R
 31 0,133 4,406

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: S

Sample: 2

Unit: mg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		c	*	V_i	
1	F02x	PZ98	DA01	1,04	1,05	0,97	1,23	0	1,07	c *	0,11	10,34
2	F28x	PZ98	DA02	1,12	1,21	1,18	1,15	4	1,17		0,04	3,32
3	F19x	PD02	DB08	1,17	1,17	1,17	1,17	4	1,17		0,00	0,00
4	A36	PD02	DB08	1,18	1,16	1,18	1,17	4	1,17		0,01	0,82
5	A59	PC01	DB08	1,20	1,19	1,19	1,18	4	1,19		0,01	0,52
6	A45x	PB99	DB08	1,20	1,21	1,19	1,21	4	1,20		0,01	0,80
7	F05x	PZ98	DA01	1,21	1,21	1,21	1,21	4	1,21		0,00	0,00
8	A57	PZ02	DD02	1,22	1,18	1,21	1,25	4	1,22		0,03	2,38
9	A86	PZ98	DA01	1,23	1,23	1,24	1,25	4	1,24		0,01	0,77
10	A88	PZ98	DA01	1,25	1,28	1,21	1,21	4	1,24		0,03	2,80
11	A58	PZ98	DA02	1,21	1,22	1,29	1,28	4	1,25		0,04	3,27
12	F25	PB06	DB08	1,26	1,27	1,27	1,28	4	1,27		0,01	0,64
13	F33x	PD01	DB10	1,27	1,37	1,23	1,23	4	1,28		0,07	5,18
14	F21x	PZ98	DA01	1,31	1,20	1,33	1,27	4	1,28		0,06	4,49
15	F03x	PD02	DB08	1,29	1,26	1,27	1,31	4	1,28		0,03	1,97
16	F12x	PC01	DB08	1,31	1,28	1,28	1,29	4	1,29		0,01	1,03
17	F14x	PC01	DB08	1,30	1,32	1,30	1,27	4	1,30		0,02	1,59
18	A47	PD01	DB08	1,33	1,29	1,32	1,29	4	1,31		0,02	1,58
19	F08x	PB99	DB08	1,29	1,28	1,36	1,31	4	1,31		0,03	2,54
20	F07x	PD99	DB08	1,31	1,32	1,29	1,33	4	1,31		0,01	1,14
21	F15x	PC01	DB08	1,33	1,33	1,32	1,31	4	1,32		0,01	0,72
22	F06x	PD02	DB08	1,31	1,32	1,33	1,35	4	1,33	c	0,02	1,26
23	F24x	PD01	DB99	1,31	1,49	1,28	1,28	0	1,34		0,10	7,54
24	F32x	PD01	DB08	1,36	1,35	1,32	1,35	4	1,35		0,02	1,29
25	A65	PD01	DB08	1,33	1,40	1,31	1,35	4	1,35		0,04	2,87
26	F16x	PC01	DB08	1,35	1,38	1,38	1,38	4	1,37		0,02	1,14
27	F13x	PD01	DB08	1,40	1,39	1,40	1,43	4	1,41		0,02	1,23
28	F27x	PZ98	DA01	1,41	1,43	1,40	1,38	4	1,41		0,02	1,60
29	F18x	PD99	DB08	1,43	1,43	1,42	1,43	4	1,43		0,01	0,35
30	A82	PD01	DB08	1,41	1,47	1,48	1,41	4	1,44		0,04	2,70
31	A60x	PD01	DB10	1,42	1,45	1,47	1,51	4	1,46		0,04	2,72
32	A62x	PZ98	DA01	1,46	1,45	1,64a	1,49	3	1,47		0,02	1,42
33	A85x	PZ98	DA01	1,60	1,58	1,55	1,56	4	1,57	*	0,02	1,41
34	A51	PD02	DB08	1,62	1,61	1,62	1,61	4	1,62	*	0,01	0,36
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* = non tolerable mean because more than +/-

n Mean s_r CV_r
 all labs 127 1,32 0,022 1,679
 15 % from the mean

I s_R CV_R
 32 0,112 8,483

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: S

Sample: 3

Unit: mg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %	
		P	D	1	2	3	4		\bar{x}	V_i			
1	A36	PD02	DB08	0,84	0,83	0,82	0,81	4	0,83		0,01	1,56	89,17
2	F19x	PD02	DB08	0,84	0,84	0,84	0,84	4	0,84		0,00	0,00	90,57
3	F07x	PD99	DB08	0,85	0,84	0,84	0,85	4	0,84		0,00	0,45	91,12
4	F12x	PC01	DB08	0,85	0,86	0,88	0,80	4	0,85		0,03	4,00	91,63
5	F03x	PD02	DB08	0,86	0,87	0,86	0,86	4	0,86		0,01	0,60	93,03
6	A59	PC01	DB08	0,87	0,87	0,88	0,86	4	0,87		0,00	0,53	93,90
7	F02x	PZ98	DA01	0,87	0,87	0,88	0,87	4	0,87		0,01	0,65	94,41
8	A45x	PB99	DB08	0,88	0,88	0,87	0,88	4	0,88		0,00	0,30	94,65
9	F33x	PD01	DB10	0,90	0,89	0,83	0,91	4	0,88		0,04	4,07	95,38
10	A86	PZ98	DA01	0,88	0,90	0,90	0,89	4	0,89		0,01	0,98	96,22
11	F14x	PC01	DB08	0,88	0,89	0,90	0,90	4	0,89		0,01	1,07	96,46
12	F32x	PD01	DB08	0,91	0,90	0,89	0,90	4	0,90		0,01	0,91	97,27
13	A82	PD01	DB08	0,91	0,91	0,90	0,89	4	0,90		0,01	1,12	97,68
14	F24x	PD01	DB99	0,91	0,91	0,91	0,90	4	0,91		0,01	0,55	98,08
15	F25	PB06	DB08	0,93	0,91	0,94	0,90	4	0,92		0,02	1,98	99,43
16	F05x	PZ98	DA01	0,93	0,92	0,93	0,92	4	0,92		0,00	0,32	99,89
17	F16x	PC01	DB08	0,92	0,93	0,91	0,93	4	0,92		0,01	0,91	99,94
18	A57	PZ02	DD02	0,91	0,93	0,92	0,94	4	0,93		0,01	1,40	99,98
19	F08x	PB99	DB08	0,92	0,91	0,94	0,94	4	0,93		0,01	1,54	100,41
20	A47	PD01	DB08	0,90	0,95	0,94	0,93	4	0,93		0,02	2,32	100,52
21	F06x	PD02	DB08	0,93	0,92	0,94	0,93	4	0,93		0,01	0,87	100,68
22	A88	PZ98	DA01	0,93	0,92	0,92	0,97	4	0,94		0,02	2,44	101,17
23	F15x	PC01	DB08	0,97	0,93	0,94	0,93	4	0,94		0,02	2,01	101,87
24	F28x	PZ98	DA02	0,92	0,99	0,97	0,94	4	0,95		0,03	3,10	103,16
25	F27x	PZ98	DA01	0,94	0,95	0,96	0,98	4	0,96		0,02	2,02	103,57
26	A65	PD01	DB08	0,97	0,95	0,96	0,96	4	0,96		0,01	0,85	103,76
27	A51	PD02	DB08	0,97	0,95	0,97	0,99	4	0,97		0,02	1,99	104,87
28	F13x	PD01	DB08	0,99	0,99	1,01	1,03	4	1,01		0,02	2,05	108,84
29	F18x	PD99	DB08	1,07	1,05	1,06	1,07	4	1,06		0,01	0,90	114,84
30	A58	PZ98	DA02	1,07	1,09	1,07	1,11	4	1,09	*	0,02	1,76	117,27
31	A60x	PD01	DB10	1,15	1,16	1,07	1,07	4	1,11	*	0,05	4,31	120,24
32	F21x	PZ98	DA01	1,25	1,18	1,24	1,20	0	1,22	b *	0,03	2,71	131,59
33	A85x	PZ98	DA01	1,28	1,24	1,22	1,25	0	1,25	b *	0,03	2,00	134,83
34	A62x	PZ98	DA01	1,19	1,29	1,30	1,38	0	1,29	b *	0,08	6,04	139,42
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* = non tolerable mean because more than +/-

n Mean s_r CV_r
 all labs 124 0,93 0,014 1,563
 15 % from the mean

I s_R CV_R
 31 0,068 7,390

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: S

Sample: 4

Unit: mg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		Lab.mean	V_i		
1	F19x	PD02	DB08	1,37	1,37	1,37	1,37	4	1,37		0,00	92,35
2	A45x	PB99	DB08	1,38	1,38	1,38	1,38	4	1,38		0,00	93,03
3	F08x	PB99	DB08	1,38	1,38	1,45	1,38	4	1,40		0,03	94,21
4	F07x	PD99	DB08	1,40	1,40	1,38	1,41	4	1,40		0,01	94,28
5	A36	PD02	DB08	1,40	1,40	1,40	1,43	4	1,41		0,02	94,88
6	F16x	PC01	DB08	1,42	1,42	1,41	1,45	4	1,42		0,02	95,88
7	A59	PC01	DB08	1,43	1,42	1,43	1,44	4	1,43		0,01	96,28
8	F18x	PD99	DB08	1,44	1,46	1,41	1,42	4	1,43		0,02	96,57
9	A86	PZ98	DA01	1,44	1,48	1,45	1,40	4	1,44		0,03	97,16
10	A57	PZ02	DD02	1,46	1,44	1,43	1,45	4	1,45		0,01	97,41
11	F25	PB06	DB08	1,46	1,46	1,44	1,43	4	1,45		0,02	97,58
12	F03x	PD02	DB08	1,45	1,44	1,46	1,46	4	1,45		0,01	98,03
13	F24x	PD01	DB99	1,44	1,51	1,45	1,45	4	1,46		0,03	98,59
14	F32x	PD01	DB08	1,46	1,46	1,49	1,44	4	1,46		0,02	98,59
15	F33x	PD01	DB10	1,51	1,48	1,42	1,44	4	1,46		0,04	98,59
16	F27x	PZ98	DA01	1,48	1,48	1,48	1,45	4	1,47		0,01	99,28
17	F28x	PZ98	DA02	1,52	1,50	1,49	1,46	4	1,49		0,03	100,61
18	F05x	PZ98	DA01	1,49	1,48	1,50	1,50	4	1,49		0,01	100,61
19	F06x	PD02	DB08	1,54	1,46	1,49	1,49	4	1,49		0,03	100,63
20	F14x	PC01	DB08	1,52	1,51	1,49	1,50	4	1,51		0,01	101,46
21	A47	PD01	DB08	1,50	1,50	1,47	1,56	4	1,51		0,04	101,62
22	F12x	PC01	DB08	1,51	1,49	1,52	1,51	4	1,51		0,01	101,67
23	F21x	PZ98	DA01	1,51	1,54	1,49	1,50	4	1,51		0,02	101,79
24	A82	PD01	DB08	1,53	1,50	1,52	1,52	4	1,52		0,01	102,26
25	F15x	PC01	DB08	1,56	1,53	1,55	1,54	4	1,55		0,01	104,15
26	A88	PZ98	DA01	1,53	1,57	1,54	1,55	4	1,55		0,02	104,25
27	F13x	PD01	DB08	1,55	1,54	1,59	1,53	4	1,55		0,03	104,66
28	A65	PD01	DB08	1,58	1,55	1,57	1,60	4	1,58		0,02	106,17
29	F02x	PZ98	DA01	1,53	1,59	1,63	1,56	4	1,58		0,04	106,34
30	A60x	PD01	DB10	1,67	1,59	1,63	1,64	4	1,63		0,03	109,99
31	A51	PD02	DB08	1,61	1,66	1,66	1,66	4	1,65		0,02	111,06
32	A58	PZ98	DA02	1,81	1,79	1,89	1,85	0	1,84	b *	0,04	123,70
33	A85x	PZ98	DA01	1,89	1,91	1,95	1,95	0	1,93	b *	0,03	129,77
34	A62x	PZ98	DA01	1,94	1,88	1,95	1,98	0	1,94	b *	0,04	130,61
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* = non tolerable mean because more than +/-

n Mean s_r CV_r
 all labs 124 1,48 0,020 1,369
 15 % from the mean

I s_R CV_R
 31 0,069 4,647

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: P Sample: 1

Unit: mg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4			V _i		
1	A43x	PB06	DE01	1,59	1,53	1,54	1,55	4	1,55		0,03	91,64
2	F27x	PD01	DE01	1,56	1,53	1,58	1,56	4	1,56		0,02	92,17
3	A59	PC01	DB08	1,58	1,58	1,57	1,57	4	1,58		0,01	93,19
4	A62x	PD02	DE01	1,59	1,43a	1,59	1,59	3	1,59		0,00	94,05
5	F19x	PD02	DB08	1,59	1,59	1,59	1,59	4	1,59		0,00	94,05
6	A57	PZ02	DD02	1,60	1,59	1,57	1,62	4	1,60		0,02	94,35
7	A82	PD01	DB08	1,60	1,62	1,58	1,60	4	1,60		0,01	94,72
8	F26x	PD02	DB09	1,63	1,61	1,61	1,63	4	1,62		0,01	95,82
9	F21x	PD02	DE01	1,63	1,64	1,60	1,61	4	1,62		0,02	95,82
10	A45x	PE99	DB08	1,63	1,64	1,65	1,62	4	1,64		0,01	96,71
11	F05x	PD02	DB08	1,65	1,66	1,65	1,65	4	1,65		0,01	97,75
12	A36	PD02	DB08	1,70	1,66	1,64	1,63	4	1,66		0,03	98,04
13	F28x	PD02	DB08	1,64	1,68	1,68	1,63	4	1,66		0,03	98,07
14	F02x	PD02	DB08	1,63	1,74	1,63	1,64	4	1,66		0,05	98,19
15	F15x	PC01	DB08	1,68	1,70	1,69	1,70	4	1,69		0,01	100,11
16	F14x	PC01	DB08	1,70	1,70	1,69	1,70	4	1,70		0,01	100,41
17	F33x	PC01	DB10	1,71	1,70	1,68	1,71	4	1,70		0,01	100,56
18	F32x	PD01	DB08	1,71	1,71	1,71	1,70	4	1,71		0,01	101,00
19	F25	PB06	DB08	1,72	1,71	1,71	1,69	4	1,71		0,01	101,00
20	F01x	PD02	DE01	1,71	1,73	1,71	1,70	4	1,71		0,01	101,30
21	F12x	PC01	DB08	1,68	1,73	1,75	1,74	4	1,72		0,03	101,99
22	F07x	PD99	DB08	1,72	1,73	1,74	1,72	4	1,73		0,01	102,11
23	A58	PD02	DE01	1,72	1,73	1,74	1,73	4	1,73		0,01	102,33
24	F24x	PD01	DB99	1,74	1,79	1,72	1,72	4	1,74		0,03	103,07
25	F08x	PE99	DB08	1,75	1,71	1,77	1,77	4	1,75		0,03	103,40
26	A88	PD01	DB08	1,75	1,78	1,72	1,75	4	1,75		0,03	103,50
27	F13x	PD01	DB08	1,79	1,76	1,76	1,69	4	1,75		0,04	103,51
28	A60x	PD01	DB10	1,75	1,74	1,74	1,77	4	1,75		0,02	103,55
29	F18x	PD99	DB08	1,77	1,75	1,76	1,75	4	1,76		0,01	103,96
30	F16x	PC01	DB08	1,76	1,74	1,80	1,76	4	1,77		0,03	104,51
31	A47	PD01	DB08	1,78	1,84	1,70	1,76	0	1,77	c	0,06	104,70
32	F03x	PD02	DB08	1,76	1,79	1,77	1,78	4	1,77		0,01	104,96
33	F06x	PD02	DB08	1,80	1,78	1,80	1,80	4	1,80		0,01	106,18
34	A65	PD01	DB08	1,76	1,87	1,81	1,82	4	1,82		0,05	107,36
35	A51	PD02	DB08	1,83	1,85	1,84	1,86	4	1,85		0,01	109,13
36	A85x	PD02	DB08	1,99	1,96	1,98	1,98	0	1,98	b *	0,01	116,88
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* = non tolerable mean because more than +/-

n Mean s_r CV_r
 all labs 135 1,69 0,018 1,071
 10 % from the mean

I S_R CV_R
 34 0,077 4,549

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: P Sample: 2

Unit: mg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		\bar{x}	s_i		
1	A59	PC01	DB08	1,54	1,54	1,54	1,55	4	1,54	*	0,00	87,67
2	F19x	PD02	DB08	1,62	1,62	1,62	1,62	4	1,62	0,00	0,00	92,08
3	A57	PZ02	DD02	1,63	1,58	1,60	1,68	4	1,62	0,04	2,68	92,22
4	A36	PD02	DB08	1,64	1,63	1,66	1,59	4	1,63	0,03	1,81	92,65
5	F27x	PD01	DE01	1,70	1,63	1,64	1,63	4	1,65	0,03	1,97	93,83
6	A45x	PE99	DB08	1,65	1,66	1,67	1,64	4	1,66	0,01	0,78	94,07
7	F33x	PC01	DB10	1,69	1,66	1,66	1,62	4	1,66	0,03	1,73	94,21
8	F26x	PD02	DB09	1,66	1,67	1,66	1,67	4	1,67	0,01	0,35	94,64
9	F21x	PD02	DE01	1,72	1,73	1,70	1,69	4	1,71	0,02	1,07	97,19
10	A62x	PD02	DE01	1,92	1,56	1,66	1,72	0	1,72	c	0,15	8,85
11	F28x	PD02	DB08	1,72	1,73	1,77	1,69	4	1,73	0,03	1,71	98,16
12	F05x	PD02	DB08	1,73	1,74	1,73	1,73	4	1,73	0,01	0,29	98,47
13	F25	PB06	DB08	1,71	1,74	1,73	1,75	4	1,73	0,02	0,99	98,47
14	A47	PD01	DB08	1,70	1,72	1,76	1,77	4	1,74	0,03	1,90	98,76
15	F07x	PD99	DB08	1,75	1,74	1,74	1,74	4	1,74	0,01	0,40	99,11
16	A43x	PB06	DE01	1,78	1,77	1,74	1,76	4	1,76	0,02	0,97	100,09
17	F16x	PC01	DB08	1,75	1,76	1,77	1,78	4	1,77	0,01	0,68	100,39
18	F01x	PD02	DE01	1,77	1,78	1,72	1,80	4	1,77	0,03	1,93	100,46
19	F12x	PC01	DB08	1,79	1,75	1,77	1,78	4	1,77	0,02	0,97	100,75
20	A60x	PD01	DB10	1,80	1,79	1,76	1,76	4	1,78	0,02	1,32	100,94
21	A82	PD01	DB08	1,79	1,74	1,79	1,79	4	1,78	0,02	1,40	101,06
22	F14x	PC01	DB08	1,76	1,81	1,80	1,76	4	1,78	0,03	1,48	101,31
23	F15x	PC01	DB08	1,80	1,83	1,79	1,75	4	1,79	0,03	1,84	101,88
24	F32x	PD01	DB08	1,80	1,77	1,81	1,80	4	1,80	0,02	0,96	102,02
25	F02x	PD02	DB08	1,69	1,76	1,65	2,08	0	1,80	c	0,20	10,88
26	A88	PD01	DB08	1,81	1,86	1,76	1,81	4	1,81	0,04	2,22	102,66
27	F18x	PD99	DB08	1,82	1,81	1,80	1,82	4	1,81	0,01	0,53	103,02
28	A58	PD02	DE01	1,84	1,80	1,82	1,82	4	1,82	0,02	0,90	103,45
29	F24x	PD01	DB99	1,75	1,90	1,84	1,80	4	1,82	0,06	3,48	103,59
30	F13x	PD01	DB08	1,83	1,80	1,83	1,83	4	1,82	0,02	0,82	103,59
31	F06x	PD02	DB08	1,82	1,80	1,82	1,86	4	1,83	0,03	1,45	103,77
32	F03x	PD02	DB08	1,85	1,79	1,80	1,88	4	1,83	0,04	2,22	103,90
33	F08x	PE99	DB08	1,87	1,85	1,80	1,81	4	1,83	0,03	1,67	104,21
34	A65	PD01	DB08	1,85	1,94	1,83	1,87	4	1,87	0,05	2,56	106,43
35	A51	PD02	DB08	1,88	1,98	1,98	1,95	4	1,95	*	0,05	2,42
36	A85x	PD02	DB08	1,97	2,04	1,99	2,05	4	2,01	*	0,04	1,81
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* = non tolerable mean because more than +/-

n Mean s_r CV_r
 all labs 136 1,76 0,025 1,413
 10 % from the mean

I s_R CV_R
 34 0,095 5,380

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: P Sample: 3

Unit: mg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %	
		P	D	1	2	3	4		\bar{x}	s_i	V_i		
1	A47	PD01	DB08	1,25	1,30	1,23	1,31	0	1,27	b *	0,04	3,04	74,36
2	A59	PC01	DB08	1,55	1,57	1,58	1,60	4	1,58		0,02	1,13	92,05
3	A36	PD02	DB08	1,59	1,59	1,58	1,54a	3	1,59		0,01	0,36	92,72
4	F12x	PC01	DB08	1,59	1,60	1,65	1,51	4	1,59		0,06	3,84	92,81
5	F19x	PD02	DB08	1,60	1,60	1,60	1,60	4	1,60		0,00	0,00	93,50
6	F27x	PD01	DE01	1,63	1,63	1,63	1,62	4	1,63		0,00	0,21	95,16
7	F33x	PC01	DB10	1,64	1,61	1,64	1,63	4	1,63		0,01	0,87	95,25
8	A43x	PB06	DE01	1,67	1,60	1,66	1,65	4	1,65		0,03	1,74	96,17
9	F16x	PC01	DB08	1,69	1,68	1,60	1,66	4	1,66		0,04	2,39	97,02
10	F05x	PD02	DB08	1,66	1,67	1,65	1,68	4	1,67		0,01	0,78	97,29
11	A45x	PE99	DB08	1,66	1,67	1,68	1,67	4	1,67		0,01	0,49	97,59
12	A57	PZ02	DD02	1,64	1,69	1,65	1,70	4	1,67		0,03	1,76	97,59
13	F28x	PD02	DB08	1,64	1,70	1,67	1,68	4	1,67		0,03	1,51	97,63
14	F03x	PD02	DB08	1,67	1,70	1,68	1,67	4	1,68		0,01	0,89	98,07
15	A82	PD01	DB08	1,66	1,68	1,69	1,69	4	1,68		0,01	0,68	98,20
16	F07x	PD99	DB08	1,68	1,69	1,70	1,69	4	1,69		0,01	0,57	98,73
17	F02x	PD02	DB08	1,63	1,67	1,71	1,78	4	1,70		0,06	3,77	99,19
18	A62x	PD02	DE01	1,62	1,66	1,79	1,72	0	1,70	c	0,07	4,37	99,19
19	F21x	PD02	DE01	1,69	1,70	1,72	1,71	4	1,71		0,01	0,76	99,63
20	F26x	PD02	DB09	1,71	1,72	1,71	1,73	4	1,72		0,01	0,56	100,36
21	F14x	PC01	DB08	1,73	1,71	1,71	1,73	4	1,72		0,01	0,67	100,51
22	A60x	PD01	DB10	1,74	1,74	1,70	1,76	4	1,73		0,02	1,32	101,32
23	F15x	PC01	DB08	1,76	1,74	1,71	1,73	4	1,74		0,02	1,20	101,38
24	F24x	PD01	DB99	1,75	1,79	1,73	1,70	4	1,74		0,04	2,17	101,82
25	F13x	PD01	DB08	1,75	1,74	1,78	1,74	4	1,75		0,02	1,08	102,41
26	F01x	PD02	DE01	1,76	1,75	1,80	1,72	4	1,76		0,03	1,88	102,70
27	A58	PD02	DE01	1,77	1,77	1,78	1,76	4	1,77		0,01	0,46	103,43
28	F06x	PD02	DB08	1,78	1,76	1,79	1,76	4	1,77		0,02	0,93	103,47
29	F32x	PD01	DB08	1,78	1,78	1,78	1,78	4	1,78		0,00	0,00	104,01
30	A88	PD01	DB08	1,78	1,80	1,77	1,78	4	1,78		0,01	0,54	104,28
31	F25	PB06	DB08	1,80	1,78	1,79	1,79	4	1,79		0,01	0,46	104,60
32	F18x	PD99	DB08	1,78	1,80	1,80	1,79	4	1,79		0,01	0,53	104,74
33	A65	PD01	DB08	1,82	1,78	1,80	1,79	4	1,80		0,02	0,95	105,04
34	F08x	PE99	DB08	1,87	1,86	1,86	1,84	4	1,86		0,01	0,72	108,48
35	A51	PD02	DB08	1,91	1,90	1,92	1,87	4	1,90	*	0,02	1,14	111,03
36	A85x	PD02	DB08	2,04	2,04	1,97	1,97	0	2,00	b *	0,04	2,09	117,00
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* = non tolerable mean because more than +/-

n Mean s_r CV_r
 all labs 131 1,71 0,019 1,094
 10 % from the mean

I s_R CV_R
 33 0,077 4,527

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: P Sample: 4

Unit: mg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %	
		P	D	1	2	3	4		b	*			
1	A47	PD01	DB08	0,57	0,58	0,58	0,57	0	0,58	b *	0,01	1,00	44,92
2	A43x	PB06	DE01	1,17	1,15	1,18	1,17	4	1,17		0,01	0,92	91,07
3	A59	PC01	DB08	1,19	1,18	1,20	1,18	4	1,19		0,01	0,67	92,79
4	A45x	PE99	DB08	1,19	1,21	1,19	1,21	4	1,20		0,01	0,96	93,75
5	F19x	PD02	DB08	1,21	1,21	1,21	1,21	4	1,21		0,00	0,00	94,53
6	F27x	PD01	DE01	1,21	1,20	1,22	1,23	4	1,22		0,01	1,22	94,99
7	F02x	PD02	DB08	1,25	1,21	1,22	1,21	4	1,22		0,02	1,55	95,50
8	F26x	PD02	DB09	1,23	1,23	1,22	1,22	4	1,23		0,01	0,47	95,70
9	A36	PD02	DB08	1,22	1,23	1,23	1,25	4	1,23		0,01	1,02	96,28
10	A57	PZ02	DD02	1,25	1,23	1,24	1,25	4	1,24		0,01	0,77	97,07
11	F33x	PC01	DB10	1,28	1,25	1,23	1,23	4	1,25		0,02	1,89	97,46
12	F07x	PD99	DB08	1,27	1,25	1,25	1,26	4	1,26		0,01	0,59	98,22
13	A82	PD01	DB08	1,26	1,25	1,26	1,26	4	1,26		0,01	0,41	98,43
14	F16x	PC01	DB08	1,28	1,28	1,26	1,27	4	1,27		0,01	0,70	99,33
15	F05x	PD02	DB08	1,27	1,27	1,28	1,28	4	1,28		0,01	0,45	99,60
16	F25	PB06	DB08	1,28	1,28	1,28	1,28	4	1,28		0,00	0,00	99,99
17	F28x	PD02	DB08	1,28	1,29	1,30	1,27	4	1,28		0,01	0,98	100,23
18	A58	PD02	DE01	1,29	1,28	1,29	1,28	4	1,29		0,01	0,45	100,39
19	F03x	PD02	DB08	1,30	1,29	1,27	1,29	4	1,29		0,01	1,02	100,50
20	A60x	PD01	DB10	1,29	1,28	1,30	1,29	4	1,29		0,01	0,49	100,68
21	F15x	PC01	DB08	1,30	1,28	1,29	1,29	4	1,29		0,01	0,63	100,78
22	F01x	PD02	DE01	1,29	1,29	1,30	1,28	4	1,29		0,01	0,63	100,78
23	F06x	PD02	DB08	1,33	1,27	1,30	1,29	4	1,29		0,03	2,08	101,13
24	F24x	PD01	DB99	1,13a	1,31	1,31	1,27	3	1,30		0,02	1,78	101,30
25	F12x	PC01	DB08	1,30	1,28	1,31	1,30	4	1,30		0,01	1,00	101,48
26	F32x	PD01	DB08	1,30	1,30	1,33	1,29	4	1,31		0,02	1,33	101,95
27	F14x	PC01	DB08	1,32	1,31	1,30	1,30	4	1,31		0,01	0,73	102,14
28	F18x	PD99	DB08	1,31	1,31	1,30	1,31	4	1,31		0,01	0,38	102,14
29	A85x	PD02	DB08	1,38	1,38	1,23	1,33	0	1,33	c	0,07	5,31	103,74
30	F21x	PD02	DE01	1,34	1,32	1,33	1,35	4	1,34		0,01	0,97	104,29
31	F08x	PE99	DB08	1,34	1,34	1,33	1,34	4	1,34		0,01	0,41	104,47
32	A65	PD01	DB08	1,35	1,33	1,33	1,36	4	1,34		0,02	1,12	104,88
33	F13x	PD01	DB08	1,40	1,38	1,38	1,38	4	1,39		0,01	0,72	108,20
34	A88	PD01	DB08	1,40	1,38	1,42	1,40	4	1,40		0,02	1,27	109,56
35	A62x	PD02	DE01	1,49	1,26	1,39	1,52	0	1,42	c *	0,12	8,29	110,54
36	A51	PD02	DB08	1,40	1,43	1,41	1,43	4	1,42	*	0,02	1,06	110,74
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* = non tolerable mean because more than +/-

n Mean s_r CV_r
 all labs 131 1,28 0,011 0,871
 10 % from the mean

I s_R CV_R
 33 0,058 4,527

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Ca Sample: 1

Unit: mg/g

No.	Lab. Code	Method code P	Method code D	Replications				n	Lab.mean		Lab.standard dev.	Recovery
				1	2	3	4		s _i	V _i	%	
1	A47	PD01	DB08	11,40	14,40	11,40	14,30	0	12,88	b *	1,70	13,23
2	A58	PD02	DB02	14,04	13,78	14,33	13,73	4	13,97		0,28	1,97
3	A59	PC01	DB08	14,10	14,01	14,24	14,30	4	14,16		0,13	0,92
4	A60x	PD01	DB10	14,19	14,22	14,22	14,40	4	14,26		0,10	0,69
5	A82	PD02	DB08	14,27	14,11	14,44	14,38	4	14,30		0,14	1,01
6	A43x	PB06	DB01	14,57	14,19	14,15	14,30	4	14,30		0,19	1,32
7	F21x	PD02	DB09	14,34	14,31	14,29	14,53	4	14,37		0,11	0,77
8	F03x	PD02	DB08	14,64	14,70	14,07	14,14	4	14,39		0,33	2,28
9	A45x	PE99	DB08	14,40	14,50	14,30	14,60	4	14,45		0,13	0,89
10	F02x	PD02	DB08	14,38	14,99	14,20	14,41	4	14,50		0,34	2,36
11	F19x	PD02	DB08	14,50	14,50	14,50	14,50	4	14,50		0,00	0,00
12	A57	PZ02	DD02	14,54	14,43	14,32	14,73	4	14,51		0,17	1,21
13	F15x	PC01	DB08	14,54	14,50	14,58	14,59	4	14,55		0,04	0,28
14	F01x	PD02	DB01	14,19	14,80	14,41	15,09	4	14,62		0,40	2,74
15	F33x	PC01	DB10	14,33	14,51	15,07	14,81	4	14,68		0,33	2,23
16	F32x	PD01	DB08	14,70	14,70	14,70	14,70	4	14,70		0,00	0,00
17	F06x	PD02	DB08	14,76	14,69	14,84	14,86	4	14,79		0,08	0,53
18	F28x	PD02	DB08	14,87	14,64	14,77	14,98	4	14,82		0,14	0,98
19	F16x	PC01	DB08	14,82	14,71	15,10	14,71	4	14,84		0,18	1,24
20	F26x	PD02	DB09	14,87	14,83	14,84	14,86	4	14,85		0,02	0,12
21	F05x	PD02	DB08	14,90	14,90	14,80	14,90	4	14,88		0,05	0,34
22	F25	PB06	DB08	15,05	14,84	14,87	15,09	4	14,96		0,13	0,84
23	F14x	PC01	DB08	15,06	14,98	14,99	14,99	4	15,01		0,04	0,25
24	F12x	PC01	DB08	14,80	15,20	15,30	15,10	4	15,10		0,22	1,43
25	A36	PD02	DB08	15,42	15,16	14,91	15,06	4	15,14		0,21	1,42
26	A65	PD01	DB08	14,78	15,67	15,24	15,08	4	15,19		0,37	2,44
27	F08x	PE99	DB08	15,45	15,34	15,31	15,31	4	15,35		0,07	0,43
28	F13x	PD01	DB08	15,25	15,67	15,54	15,10	4	15,39		0,26	1,70
29	F07x	PD99	DB08	15,43	15,48	15,69	15,66	4	15,57		0,13	0,83
30	A62x	PD02	DB06	15,14	16,12	15,49	15,99	4	15,69		0,45	2,89
31	F18x	PD99	DB08	15,70	15,70	15,80	15,70	4	15,73		0,05	0,32
32	F24x	PD01	DB99	15,02	15,95	15,91	16,10	4	15,75		0,49	3,11
33	A51	PD02	DB08	15,70	15,90	15,90	15,60	4	15,78		0,15	0,95
34	A88	PD01	DB08	16,37	16,95	15,80	16,37	4	16,37		0,47	2,87
35	A85x	PD02	DB08	16,67	16,51	15,95	17,05	4	16,55	*	0,46	2,76
36	F27x	PD01	DB01	18,94	18,06	17,26	18,60	0	18,21	b *	0,73	4,02
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* = non tolerable mean because more than +/-

n Mean S_r CV_r
 all labs 136 14,94 0,196 1,311
 10 % from the mean

I S_R CV_R
 34 0,622 4,162

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Ca

Sample: 2

Unit: mg/g

No.	Lab. Code	Method code P D	Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
			1	2	3	4					
1	F01x	PD02	DB01	14,75	14,31	14,64	14,88	4	14,65	*	0,24
2	F21x	PD02	DB09	14,93	15,39	15,03	15,20	4	15,14	0,20	1,33
3	A57	PZ02	DD02	15,10	15,35	15,83	15,22	4	15,38	0,32	2,08
4	A58	PD02	DB02	15,33	15,47	15,59	15,52	4	15,48	0,11	0,71
5	F26x	PD02	DB09	15,54	15,61	15,60	15,55	4	15,58	0,04	0,23
6	A59	PC01	DB08	15,76	15,76	15,69	15,59	4	15,70	0,08	0,50
7	F03x	PD02	DB08	16,39	16,22	15,86	14,43	4	15,73	0,89	5,67
8	A60x	PD01	DB10	15,91	15,63	15,35	16,04	4	15,73	0,30	1,93
9	A43x	PB06	DB01	15,55	15,63	15,73	16,02	4	15,73	0,21	1,31
10	F33x	PC01	DB10	16,35	15,89	15,38	15,57	4	15,80	0,42	2,69
11	A82	PD02	DB08	16,06	16,10	16,49	16,30	4	16,24	0,20	1,22
12	A36	PD02	DB08	16,32	16,77	16,31	16,27	4	16,42	0,24	1,44
13	A45x	PE99	DB08	16,20	16,60	16,40	16,50	4	16,43	0,17	1,04
14	A47	PD01	DB08	16,40	17,30	15,60	16,70	4	16,50	0,71	4,29
15	F05x	PD02	DB08	16,60	16,60	16,60	16,60	4	16,60	0,00	0,00
16	F16x	PC01	DB08	16,52	16,82	16,51	16,60	4	16,61	0,14	0,87
17	A65	PD01	DB08	16,35	17,11	16,33	16,78	4	16,64	0,37	2,25
18	F12x	PC01	DB08	16,90	16,50	16,60	16,60	4	16,65	0,17	1,04
19	F19x	PD02	DB08	16,80	16,80	16,80	16,80	4	16,80	0,00	0,00
20	F25	PB06	DB08	16,84	16,92	16,74	16,83	4	16,83	0,07	0,44
21	F06x	PD02	DB08	16,92	17,08	16,90	16,72	4	16,91	0,15	0,87
22	F15x	PC01	DB08	17,16	17,08	16,61	16,92	4	16,94	0,24	1,43
23	F32x	PD01	DB08	17,10	16,90	16,80	17,10	4	16,98	0,15	0,88
24	F14x	PC01	DB08	16,65	17,15	16,99	17,28	4	17,02	0,27	1,60
25	F07x	PD99	DB08	16,93	17,22	16,96	17,32	4	17,11	0,19	1,12
26	F08x	PE99	DB08	17,16	17,04	17,25	17,41	4	17,21	0,16	0,92
27	F28x	PD02	DB08	17,07	17,34	17,30	17,49	4	17,30	0,17	1,00
28	F13x	PD01	DB08	17,33	17,44	17,41	17,20	4	17,35	0,11	0,62
29	F02x	PD02	DB08	16,90	17,26	16,09	19,18	0	17,36	c	1,31
30	A62x	PD02	DB06	17,60	16,75	16,92	18,30	4	17,39	0,71	4,07
31	F18x	PD99	DB08	17,70	17,60	17,60	17,60	4	17,63	0,05	0,28
32	F24x	PD01	DB99	17,08	18,29	17,86	17,33	4	17,64	0,54	3,07
33	A51	PD02	DB08	17,80	17,90	17,70	18,30	4	17,93	0,26	1,47
34	A85x	PD02	DB08	18,49	18,40	17,65	17,99	4	18,13	0,39	2,14
35	A88	PD01	DB08	18,56	18,75	18,38	18,56	4	18,56	*	0,15
36	F27x	PD01	DB01	24,29	20,53	22,27	24,24	0	22,83	b *	1,80
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* = non tolerable mean because more than +/-

n Mean S_r CV_r
 all labs 136 16,61 0,248 1,494
 10 % from the mean

I S_R CV_R
 34 0,900 5,418

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Ca

Sample: 3

Unit: mg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %	
		P	D	1	2	3	4		b^*	V_i			
1	F01x	PD02	DB01	1,64	1,79	1,82	1,68	0	1,73	b^*	0,09	4,97	72,93
2	F26x	PD02	DB09	2,16	2,16	2,15	2,17	4	2,16		0,01	0,38	90,92
3	A36	PD02	DB08	2,21	2,22	2,14	2,16	4	2,18		0,04	1,77	91,87
4	A58	PD02	DB02	2,26	2,31	2,13	2,09	4	2,20		0,10	4,75	92,50
5	A59	PC01	DB08	2,26	2,22	2,24	2,24	4	2,24		0,02	0,76	94,17
6	F19x	PD02	DB08	2,25	2,25	2,25	2,25	4	2,25		0,00	0,00	94,71
7	F02x	PD02	DB08	2,22	2,19	2,22	2,38	4	2,25		0,09	3,83	94,82
8	A45x	PE99	DB08	2,27	2,24	2,25	2,29	4	2,26		0,02	0,98	95,24
9	F15x	PC01	DB08	2,26	2,28	2,25	2,27	4	2,27		0,01	0,57	95,34
10	A47	PD01	DB08	2,30	2,20	2,30	2,30	4	2,28		0,05	2,20	95,76
11	F05x	PD02	DB08	2,30	2,28	2,28	2,29	4	2,29		0,01	0,42	96,29
12	A60x	PD01	DB10	2,29	2,33	2,25	2,30	4	2,29		0,03	1,40	96,49
13	F16x	PC01	DB08	2,28	2,35	2,35	2,36	4	2,33		0,04	1,65	98,24
14	F14x	PC01	DB08	2,33	2,36	2,32	2,33	4	2,34		0,02	0,74	98,29
15	F32x	PD01	DB08	2,38	2,37	2,30	2,30	4	2,34		0,04	1,86	98,39
16	F25	PB06	DB08	2,34	2,33	2,36	2,34	4	2,34		0,01	0,54	98,60
17	F03x	PD02	DB08	2,33	2,30	2,43	2,31	4	2,34		0,06	2,55	98,60
18	F06x	PD02	DB08	2,38	2,37	2,33	2,33	4	2,35		0,03	1,15	99,04
19	A82	PD02	DB08	2,27	2,40	2,37	2,40	4	2,36		0,06	2,74	99,30
20	F18x	PD99	DB08	2,38	2,39	2,40	2,36	4	2,38		0,02	0,72	100,29
21	F28x	PD02	DB08	2,38	2,40	2,37	2,39	4	2,39		0,01	0,59	100,42
22	F21x	PD02	DB09	2,34	2,44	2,40	2,37	4	2,39		0,04	1,79	100,50
23	F07x	PD99	DB08	2,39	2,43	2,40	2,41	4	2,41		0,02	0,69	101,23
24	A62x	PD02	DB06	2,45	2,47	2,45	2,41	4	2,45		0,03	1,03	102,92
25	A65	PD01	DB08	2,42	2,44	2,40	2,52	4	2,45		0,05	2,15	102,92
26	F13x	PD01	DB08	2,44	2,42	2,53	2,40	4	2,45		0,06	2,34	103,02
27	F12x	PC01	DB08	2,49	2,48	2,53	2,32	4	2,46		0,09	3,77	103,34
28	A43x	PB06	DB01	2,53	2,58	2,26	2,46	4	2,46		0,14	5,72	103,44
29	F08x	PE99	DB08	2,40	2,49	2,50	2,50	4	2,47		0,05	2,12	104,15
30	F33x	PC01	DB10	2,47	2,57	2,46	2,60	4	2,53		0,07	2,79	106,29
31	A51	PD02	DB08	2,52	2,53	2,59	2,51	4	2,54		0,04	1,42	106,81
32	F24x	PD01	DB99	2,48	2,64	2,67	2,62	4	2,60		0,08	3,24	109,55
33	A88	PD01	DB08	2,65	2,66	2,64	2,65	4	2,65		0,01	0,31	111,68
34	A85x	PD02	DB08	2,81	2,65	2,72	2,73	4	2,73		0,07	2,46	114,86
35	A57	PZ02	DD02	2,91	2,90	2,89	2,90	0	2,90	b^*	0,01	0,28	122,07
36	F27x	PD01	DB01	2,82	3,06	2,82	3,07	0	2,94	b^*	0,14	4,76	123,74
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* = non tolerable mean because more than +/-

n Mean s_r CV_r
 all labs 132 2,38 0,043 1,813
 15 % from the mean

Limit for the lower concentration range

| s_R CV_R
 33 0,133 5,587

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Ca Sample: 4

Unit: mg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4			V _i		
1	F01x	PD02	DB01	4,70	4,61	4,76	4,80	4	4,72		0,08	91,25
2	F26x	PD02	DB09	4,79	4,74	4,75	4,78	4	4,77		0,02	92,17
3	A58	PD02	DB02	4,84	4,75	4,88	5,14	4	4,90		0,17	94,83
4	A60x	PD01	DB10	4,90	4,91	4,91	4,98	4	4,93		0,03	95,29
5	F02x	PD02	DB08	4,88	4,96	5,10	4,86	4	4,95		0,11	95,75
6	A59	PC01	DB08	4,99	4,92	4,88	5,02	4	4,95		0,06	95,80
7	A45x	PE99	DB08	5,00	5,01	5,02	5,02	4	5,01		0,01	96,96
8	F15x	PC01	DB08	5,03	5,03	5,02	5,07	4	5,04		0,02	97,44
9	F19x	PD02	DB08	5,10	5,10	5,10	5,10	4	5,10		0,00	98,65
10	F21x	PD02	DB09	5,13	5,14	5,10	5,08	4	5,11		0,03	98,89
11	F28x	PD02	DB08	5,07	5,24	4,94	5,21	4	5,11		0,14	98,92
12	F33x	PC01	DB10	5,22	5,02	5,28	4,96	4	5,12		0,15	99,04
13	F08x	PE99	DB08	5,17	5,13	5,16	5,08	4	5,13		0,04	99,29
14	A36	PD02	DB08	5,08	5,13	5,22	5,17	4	5,15		0,06	99,62
15	A82	PD02	DB08	5,14	5,15	5,21	5,14	4	5,16		0,03	99,75
16	F16x	PC01	DB08	5,19	5,15	5,14	5,21	4	5,17		0,03	100,06
17	F03x	PD02	DB08	5,25	5,16	5,20	5,14	4	5,19		0,05	100,34
18	F05x	PD02	DB08	5,19	5,22	5,19	5,18	4	5,20		0,02	100,49
19	A47	PD01	DB08	5,30	5,30	5,00	5,20	4	5,20		0,14	100,59
20	F32x	PD01	DB08	5,17	5,23	5,23	5,21	4	5,21		0,03	100,78
21	A57	PZ02	DD02	5,25	5,26	5,17	5,19	4	5,22		0,04	100,92
22	F14x	PC01	DB08	5,30	5,20	5,20	5,20	4	5,23		0,05	101,07
23	F12x	PC01	DB08	5,18	5,28	5,25	5,21	4	5,23		0,04	101,17
24	F25	PB06	DB08	5,22	5,25	5,22	5,24	4	5,23		0,02	101,21
25	F06x	PD02	DB08	5,25	5,26	5,31	5,25	4	5,27		0,03	101,87
26	F18x	PD99	DB08	5,26	5,31	5,28	5,33	4	5,30		0,03	102,42
27	A65	PD01	DB08	5,41	5,33	5,39	5,28	4	5,35		0,06	103,54
28	F07x	PD99	DB08	5,38	5,37	5,39	5,40	4	5,38		0,01	104,13
29	A43x	PB06	DB01	5,48	5,27	5,80	5,21	0	5,44	c	0,27	105,23
30	A51	PD02	DB08	5,46	5,43	5,44	5,45	4	5,45		0,01	105,33
31	F13x	PD01	DB08	5,45	5,50	5,39	5,47	4	5,45		0,05	105,47
32	F24x	PD01	DB99	5,30	5,54	5,64	5,53	4	5,50		0,14	106,44
33	A85x	PD02	DB08	5,96	5,47	5,74	5,69	4	5,71	*	0,20	3,47
34	A62x	PD02	DB06	5,93	5,48	5,70	6,17	0	5,82	b *	0,30	5,10
35	A88	PD01	DB08	6,12	6,11	6,14	6,12	0	6,12	b *	0,01	0,14
36	F27x	PD01	DB01	7,08	7,13	6,92	7,13	0	7,06	b *	0,10	1,42
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* = non tolerable mean because more than +/-

n Mean s_r CV_r
 all labs 128 5,17 0,060 1,161
 10 % from the mean

I s_R CV_R
 32 0,207 4,013

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Mg Sample: 1

Unit: mg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %	
		P	D	1	2	3	4		c	V_i			
1	F27x	PD01	DB01	3,40	3,35	3,18	3,21	4	3,28		0,11	3,27	90,01
2	A59	PC01	DB08	3,30	3,29	3,31	3,27	4	3,29		0,02	0,51	90,27
3	A43x	PB06	DB01	3,53	3,10	3,32	3,46	0	3,35	c	0,19	5,66	91,93
4	A60x	PD01	DB10	3,34	3,36	3,35	3,38	4	3,36		0,02	0,47	92,04
5	F21x	PD02	DB09	3,42	3,47	3,44	3,45	4	3,45		0,02	0,60	94,47
6	A47	PD01	DB08	3,46	3,49	3,47	3,51	4	3,48		0,02	0,64	95,50
7	A45x	PE99	DB08	3,48	3,49	3,50	3,52	4	3,50		0,02	0,49	95,91
8	F03x	PD02	DB08	3,56	3,57	3,43	3,47	4	3,51		0,07	1,94	96,18
9	F02x	PD02	DB08	3,51	3,59	3,45	3,48	4	3,51		0,06	1,72	96,18
10	A57	PZ02	DD02	3,56	3,54	3,49	3,58	4	3,54		0,04	1,09	97,14
11	F18x	PD99	DB08	3,55	3,58	3,57	3,48	4	3,55		0,05	1,27	97,21
12	F26x	PD02	DB09	3,57	3,56	3,55	3,55	4	3,56		0,01	0,27	97,56
13	A82	PD01	DB08	3,60	3,54	3,56	3,55	4	3,56		0,03	0,78	97,64
14	F05x	PD02	DB08	3,55	3,58	3,59	3,54	4	3,57		0,02	0,67	97,76
15	F33x	PC01	DB10	3,51	3,54	3,61	3,66	4	3,58		0,07	1,89	98,17
16	A58	PD02	DB01	3,69	3,50	3,62	3,57	4	3,60		0,08	2,23	98,58
17	F32x	PD01	DB08	3,62	3,62	3,61	3,58	4	3,61		0,02	0,52	98,93
18	F15x	PC01	DB08	3,64	3,66	3,66	3,59	4	3,64		0,03	0,91	99,75
19	F07x	PD99	DB08	3,65	3,60	3,65	3,66	4	3,64		0,03	0,73	99,83
20	A36	PD02	DB08	3,70	3,65	3,60	3,62	4	3,64		0,04	1,19	99,89
21	F01x	PD02	DB01	3,68	3,71	3,62	3,65	4	3,67		0,04	1,06	100,50
22	F13x	PD01	DB08	3,67	3,74	3,68	3,61	4	3,68		0,05	1,45	100,78
23	F08x	PE99	DB08	3,72	3,64	3,71	3,67	4	3,68		0,03	0,92	101,04
24	F14	PC01	DB08	3,70	3,67	3,70	3,68	4	3,69		0,02	0,41	101,12
25	F12x	PC01	DB08	3,62	3,71	3,74	3,71	4	3,69		0,05	1,40	101,26
26	F19x	PD02	DB08	3,70	3,70	3,70	3,70	4	3,70		0,00	0,00	101,46
27	F28x	PD02	DB08	3,74	3,78	3,65	3,68	4	3,71		0,06	1,58	101,76
28	F06x	PD02	DB08	3,73	3,69	3,76	3,70	4	3,72		0,03	0,79	102,00
29	A65	PD01	DB08	3,63	3,83	3,73	3,73	4	3,73		0,08	2,17	102,26
30	F16x	PC01	DB08	3,85	3,82	3,74	3,90	4	3,83		0,07	1,83	104,92
31	A88	PD01	DB08	3,85	3,73	3,97	3,85	4	3,85		0,10	2,60	105,57
32	F25	PB06	DB08	3,91	3,92	3,91	3,94	4	3,92		0,01	0,36	107,50
33	A51	PD02	DB08	3,87	3,96	3,98	3,88	4	3,92		0,06	1,42	107,56
34	F24x	PD01	DB99	3,73	3,97	3,98	4,01	4	3,92		0,13	3,30	107,56
35	A62x	PD02	DB06	3,81	4,11	3,86	3,98	4	3,94		0,13	3,40	108,04
36	A85x	PD02	DB08	4,15	4,15	4,21	4,06	4	4,14	*	0,06	1,46	113,62
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* = non tolerable mean because more than +/-

n Mean S_r CV_r
 all labs 140 3,65 0,048 1,307
 10 % from the mean

I S_R CV_R
 35 0,186 5,112

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Mg Sample: 2

Unit: mg/g

No.	Lab. Code	Method code P	Method code D	Replications				n	Lab.mean		Lab.standard dev.	Recovery %
				1	2	3	4		s _i	V _i		
1	A58	PD02	DB01	2,19	2,10	2,12	2,09	4	2,13	*	0,05	2,12 86,57
2	A43x	PB06	DB01	2,09	2,25	2,31	2,20	4	2,21		0,09	4,25 90,10
3	A59	PC01	DB08	2,21	2,23	2,23	2,26	4	2,23		0,02	0,91 90,99
4	A60x	PD01	DB10	2,23	2,24	2,26	2,22	4	2,24		0,02	0,75 91,13
5	F27x	PD01	DB01	2,24	2,26	2,27	2,20	4	2,24		0,03	1,43 91,34
6	A36	PD02	DB08	2,32	2,30	2,33	2,29	4	2,31		0,02	0,79 94,10
7	F03x	PD02	DB08	2,41	2,38	2,32	2,15	4	2,31		0,11	4,89 94,26
8	F26x	PD02	DB09	2,34	2,36	2,33	2,32	4	2,34		0,02	0,73 95,22
9	F21x	PD02	DB09	2,34	2,36	2,35	2,37	4	2,36		0,01	0,55 95,94
10	F33x	PC01	DB10	2,39	2,46	2,27	2,36	4	2,37		0,08	3,32 96,55
11	A45x	PE99	DB08	2,38	2,37	2,38	2,39	4	2,38		0,01	0,34 96,96
12	F18x	PD99	DB08	2,41	2,39	2,39	2,38	4	2,39		0,01	0,53 97,47
13	A47	PD01	DB08	2,51	2,42	2,37	2,40	4	2,43		0,06	2,49 98,79
14	F08x	PE99	DB08	2,36	2,35	2,52	2,53	4	2,44		0,10	4,20 99,36
15	F32x	PD01	DB08	2,44	2,42	2,46	2,46	4	2,45		0,02	0,78 99,60
16	F07x	PD99	DB08	2,41	2,44	2,44	2,49	4	2,45		0,03	1,35 99,69
17	F15x	PC01	DB08	2,47	2,44	2,44	2,44	4	2,45		0,02	0,61 99,71
18	F05x	PD02	DB08	2,44	2,44	2,48	2,48	4	2,46		0,02	0,94 100,21
19	F13x	PD01	DB08	2,47	2,45	2,48	2,48	4	2,47		0,01	0,57 100,62
20	A62x	PD02	DB06	2,50	2,37	2,46	2,55	4	2,47		0,08	3,08 100,62
21	F02x	PD02	DB08	2,38	2,45	2,31	2,77	0	2,48	c	0,20	8,20 100,93
22	F25	PB06	DB08	2,46	2,49	2,47	2,49	4	2,48		0,02	0,61 100,93
23	F16x	PC01	DB08	2,52	2,49	2,45	2,47	4	2,48		0,03	1,10 101,17
24	A65	PD01	DB08	2,50	2,56	2,42	2,50	4	2,49		0,06	2,29 101,63
25	A82	PD01	DB08	2,51	2,50	2,50	2,49	4	2,50		0,01	0,34 101,79
26	F14	PC01	DB08	2,48	2,55	2,48	2,50	4	2,50		0,03	1,32 101,95
27	F19x	PD02	DB08	2,51	2,51	2,51	2,51	4	2,51		0,00	0,00 102,25
28	F01x	PD02	DB01	2,49	2,54	2,53	2,51	4	2,52		0,02	0,88 102,56
29	F06x	PD02	DB08	2,54	2,53	2,49	2,53	4	2,52		0,02	0,73 102,68
30	F12x	PC01	DB08	2,59	2,53	2,55	2,55	4	2,55		0,02	0,92 104,06
31	F28x	PD02	DB08	2,66	2,60	2,58	2,70	4	2,64		0,05	1,97 107,34
32	A57	PZ02	DD02	2,66	2,59	2,64	2,67	4	2,64		0,04	1,35 107,55
33	A51	PD02	DB08	2,63	2,72	2,68	2,68	4	2,68		0,04	1,38 109,08
34	A88	PD01	DB08	2,69	2,74	2,64	2,69	4	2,69		0,04	1,63 109,53
35	F24x	PD01	DB99	2,61	2,79	2,79	2,76	4	2,74	*	0,09	3,15 111,52
36	A85x	PD02	DB08	2,83	2,94	2,81	2,89	4	2,87	*	0,06	1,98 116,72
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* = non tolerable mean because more than +/-

n Mean S_r CV_r
all labs 140 2,45 0,038 1,546
10 % from the mean

I S_R CV_R
35 0,157 6,405

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Mg Sample: 3

Unit: mg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %	
		P	D	1	2	3	4		b	*	V_i		
1	A62x	PD02	DB06	0,90	0,94	0,95	0,91	0	0,93	b *	0,02	2,57	73,80
2	A58	PD02	DB01	1,07	1,08	1,05	1,08	4	1,07	*	0,01	1,32	85,37
3	A60x	PD01	DB10	1,14	1,16	1,15	1,16	4	1,15		0,01	0,99	91,85
4	A36	PD02	DB08	1,17	1,17	1,14	1,15	4	1,16		0,02	1,30	92,36
5	F03x	PD02	DB08	1,18	1,19	1,19	1,18	4	1,18		0,01	0,61	94,37
6	A43x	PB06	DB01	1,16	1,21	1,21	1,20	4	1,20		0,03	2,11	95,35
7	A59	PC01	DB08	1,20	1,21	1,18	1,19	4	1,20		0,01	0,96	95,39
8	F12x	PC01	DB08	1,20	1,21	1,24	1,14	4	1,20		0,04	3,74	95,59
9	F21x	PD02	DB09	1,21	1,19	1,20	1,22	4	1,21		0,01	1,07	96,15
10	F05x	PD02	DB08	1,22	1,20	1,20	1,21	4	1,21		0,01	0,79	96,35
11	A47	PD01	DB08	1,21	1,19	1,21	1,23	4	1,21		0,02	1,35	96,54
12	F16x	PC01	DB08	1,22	1,20	1,22	1,21	4	1,21		0,01	1,02	96,64
13	A45x	PE99	DB08	1,20	1,21	1,22	1,23	4	1,22		0,01	1,06	96,94
14	F02x	PD02	DB08	1,20	1,19	1,21	1,27	4	1,22		0,04	2,95	97,14
15	F27x	PD01	DB01	1,28	1,20	1,16	1,27	4	1,23		0,06	4,76	98,10
16	F33x	PC01	DB10	1,22	1,25	1,21	1,27	4	1,24		0,03	2,23	98,74
17	A82	PD01	DB08	1,24	1,23	1,24	1,25	4	1,24		0,01	0,76	98,84
18	F26x	PD02	DB09	1,25	1,25	1,23	1,23	4	1,24		0,01	0,93	98,94
19	F18x	PD99	DB08	1,26	1,26	1,26	1,25	4	1,26		0,01	0,40	100,33
20	F07x	PD99	DB08	1,25	1,25	1,25	1,29	4	1,26		0,02	1,60	100,43
21	F19x	PD02	DB08	1,26	1,26	1,26	1,26	4	1,26		0,00	0,00	100,53
22	F15x	PC01	DB08	1,27	1,28	1,26	1,25	4	1,27		0,01	1,02	100,93
23	F14	PC01	DB08	1,26	1,27	1,27	1,27	4	1,27		0,01	0,39	101,13
24	F25	PB06	DB08	1,27	1,26	1,27	1,27	4	1,27		0,01	0,39	101,13
25	A57	PZ02	DD02	1,26	1,28	1,26	1,28	4	1,27		0,01	0,91	101,33
26	F13x	PD01	DB08	1,27	1,27	1,28	1,30	4	1,28		0,01	1,10	102,13
27	F32x	PD01	DB08	1,29	1,29	1,27	1,27	4	1,28		0,01	0,90	102,13
28	F01x	PD02	DB01	1,32	1,27	1,29	1,25	4	1,28		0,03	2,33	102,33
29	F28x	PD02	DB08	1,28	1,24	1,29	1,34	4	1,29		0,04	3,22	102,77
30	F06x	PD02	DB08	1,30	1,28	1,30	1,28	4	1,29		0,01	0,88	102,91
31	A65	PD01	DB08	1,36	1,30	1,30	1,29	4	1,31		0,03	2,59	104,82
32	F08x	PE99	DB08	1,28	1,29	1,33	1,37	4	1,32		0,04	3,02	105,06
33	A85x	PD02	DB08	1,42	1,39	1,40	1,34	4	1,39	*	0,03	2,39	110,81
34	A51	PD02	DB08	1,38	1,40	1,42	1,39	4	1,40	*	0,02	1,22	111,51
35	F24x	PD01	DB99	1,33	1,42	1,44	1,42	4	1,40	*	0,05	3,51	111,90
36	A88	PD01	DB08	1,42	1,49	1,34	1,42	4	1,42	*	0,06	4,22	113,15
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* = non tolerable mean because more than +/-

n Mean s_r CV_r
 all labs 140 1,25 0,021 1,681
 10 % from the mean

I s_R CV_R
 35 0,073 5,837

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Mg Sample: 4

Unit: mg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %		
		P	D	1	2	3	4		b	V_i				
1	A62x	PD02	DB06	0,49	0,46	0,46	0,54	0	0,49		0,04	7,74	61,33	
2	A60x	PD01	DB10	0,73	0,7155a	0,73	0,73	3	0,73		0,00	0,14	91,40	
3	F08x	PE99	DB08	0,75	0,72	0,75	0,74	4	0,74		0,02	2,04	93,04	
4	F26x	PD02	DB09	0,75	0,75	0,74	0,74	4	0,75		0,01	0,77	93,73	
5	F16x	PC01	DB08	0,75	0,76	0,74	0,76	4	0,75		0,01	0,95	94,36	
6	F03x	PD02	DB08	0,76	0,75	0,76	0,75	4	0,75		0,01	0,76	94,67	
7	A59	PC01	DB08	0,76	0,75	0,75	0,76	4	0,75		0,01	1,08	94,67	
8	F21x	PD02	DB09	0,75	0,76	0,77	0,74	4	0,76		0,01	1,71	94,99	
9	A45x	PE99	DB08	0,76	0,76	0,76	0,75	4	0,76		0,00	0,51	95,34	
10	A43x	PB06	DB01	0,80	0,75	0,75	0,75	4	0,76		0,03	3,49	95,40	
11	F02x	PD02	DB08	0,75	0,75	0,79	0,75	4	0,76		0,02	2,63	95,62	
12	A47	PD01	DB08	0,76	0,78	0,77	0,75	4	0,77		0,01	1,69	96,25	
13	A36	PD02	DB08	0,77	0,76	0,77	0,78	4	0,77		0,01	0,89	96,66	
14	F28x	PD02	DB08	0,74	0,78	0,76	0,80	4	0,77		0,03	3,42	96,94	
15	F32x	PD01	DB08	0,77	0,77	0,79	0,77	4	0,77		0,01	1,22	97,22	
16	A58	PD02	DB01	0,77	0,78	0,77	0,78	4	0,78		0,01	0,74	97,51	
17	F18x	PD99	DB08	0,78	0,78	0,78	0,78	4	0,78		0,00	0,22	97,98	
18	F15x	PC01	DB08	0,78	0,78	0,78	0,78	4	0,78		0,00	0,00	98,13	
19	F33x	PC01	DB10	0,79	0,81	0,79	0,75	4	0,79		0,03	3,21	98,76	
20	F07x	PD99	DB08	0,79	0,79	0,79	0,80	4	0,79		0,00	0,54	99,90	
21	F14	PC01	DB08	0,81	0,79	0,79	0,79	4	0,80		0,01	1,26	100,02	
22	F13x	PD01	DB08	0,80	0,80	0,79	0,79	4	0,80		0,00	0,46	100,02	
23	F06x	PD02	DB08	0,81	0,77	0,80	0,80	4	0,80		0,02	2,51	100,05	
24	F05x	PD02	DB08	0,80	0,80	0,80	0,80	4	0,80		0,00	0,30	100,43	
25	F25	PB06	DB08	0,80	0,80	0,80	0,81	4	0,80		0,00	0,18	101,03	
26	F12x	PC01	DB08	0,81	0,80	0,81	0,80	4	0,81		0,01	0,72	101,31	
27	F27x	PD01	DB01	0,85	0,78	0,86	0,83	0	0,83		c	0,04	4,67	104,33
28	F01x	PD02	DB01	0,83	0,81	0,84	0,85	4	0,83		0,02	2,05	104,74	
29	A65	PD01	DB08	0,84	0,83	0,83	0,83	4	0,83		0,00	0,52	104,87	
30	F24x	PD01	DB99	0,82	0,88	0,88	0,87	4	0,86		0,03	3,33	108,51	
31	F19x	PD02	DB08	0,86	0,86	0,86	0,86	4	0,86		0,00	0,00	108,58	
32	A51	PD02	DB08	0,85	0,85	0,87	0,89	4	0,87		0,02	2,21	108,83	
33	A88	PD01	DB08	0,88	0,89	0,87	0,88	4	0,88	*	0,01	0,87	111,20	
34	A57	PZ02	DD02	0,92a	0,91	0,91	0,91	3	0,91	*	0,00	0,00	114,49	
35	A85x	PD02	DB08	0,92	0,91	0,92	0,91	4	0,91	*	0,01	0,60	114,81	
36	A82	PD01	DB08	2,46	2,44	2,45	2,47	0	2,45	b *	0,02	0,70	308,68	
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* = non tolerable mean because more than +/-

n Mean s_r CV_r
 all labs 130 0,79 0,010 1,237
 10 % from the mean

I s_R CV_R
 33 0,049 6,179

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: K Sample: 1

Unit: mg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4			V _i		
1	F27x	PD01	DB06	19,60	20,27	20,74	21,07	4	20,42	*	0,64	86,19
2	A43x	PB06	DB01	20,11	20,33	20,33	21,70	4	20,62	*	0,73	87,02
3	A58	PD02	DB01	21,06	21,57	21,12	20,58	4	21,08	*	0,40	88,99
4	F21x	PD02	DB09	21,71	21,84	22,18	21,98	4	21,93		0,20	92,55
5	A62x	PD02	DB06	21,58	22,96	21,86	22,14	4	22,14		0,60	93,43
6	F25	PB06	DB08	22,73	22,75	22,99	22,73	4	22,80		0,13	96,24
7	A60x	PD01	DB10	23,16	22,64	23,01	23,24	4	23,01		0,26	97,13
8	A57	PZ02	DD02	22,98	23,00	22,81	23,34	4	23,03		0,22	97,22
9	F08x	PZ99	DB08	23,68	23,65	22,63	22,43	4	23,10		0,66	97,49
10	A59	PC01	DB08	23,07	23,04	23,10	23,37	4	23,15		0,15	97,69
11	A82	PD02	DB08	23,37	23,43	23,65	23,59	4	23,51		0,13	99,23
12	A45x	PB99	DB08	23,50	23,40	23,60	23,70	4	23,55		0,13	99,40
13	F03x	PD02	DB08	23,76	24,04	23,04	23,45	4	23,57		0,43	99,49
14	A47	PD01	DB08	23,70	23,70	23,50	23,70	4	23,65		0,10	99,82
15	F05x	PD02	DB08	23,60	23,80	23,60	23,80	4	23,70		0,12	100,03
16	F33x	PC01	DB10	23,96	23,67	23,70	23,49	4	23,71		0,19	100,05
17	A65	PD01	DB08	22,85	24,72	23,49	23,76	4	23,71		0,78	3,28
18	F32x	PD01	DB08	23,70	23,80	23,90	23,60	4	23,75		0,13	100,24
19	F26x	PD02	DB09	23,79	23,75	23,74	23,73	4	23,75		0,03	100,26
20	F24x	PD01	DB99	22,93	24,22	24,21	24,18	4	23,89		0,64	100,81
21	A88	PD01	DB08	24,00	24,75	23,25	24,00	4	24,00		0,61	101,29
22	A36	PD02	DB08	24,07	24,18	23,93	23,87	4	24,01		0,14	101,35
23	F28x	PD02	DB08	24,20	24,18	23,61	24,57	4	24,14		0,40	101,89
24	F18x	PD99	DB08	24,20	24,10	24,20	24,10	4	24,15		0,06	101,93
25	F15x	PC01	DB08	24,19	24,21	24,27	24,04	4	24,18		0,10	102,05
26	F01x	PD02	DB01	24,50	24,70	24,23	24,04	4	24,37		0,29	102,85
27	F16x	PC01	DB08	24,56	25,07	24,21	24,31	4	24,54		0,38	103,57
28	F13x	PD01	DB08	24,60	24,95	24,69	23,93	4	24,54		0,43	103,59
29	F06x	PD02	DB08	24,58	24,37	24,66	24,66	4	24,57		0,14	103,70
30	F12x	PC01	DB08	24,50	25,00	25,30	25,10	4	24,98		0,34	105,42
31	F19x	PD02	DB08	25,10	25,10	25,10	25,10	4	25,10		0,00	105,94
32	F02x	PD02	DB08	24,37	25,91	25,20	25,24	4	25,18		0,63	106,28
33	A51	PD02	DB08	25,80	25,60	25,60	25,50	4	25,63		0,13	108,16
34	F14x	PC01	DB08	25,95	25,32	25,58	25,67	4	25,63		0,26	108,18
35	F07x	PD99	DB08	26,10	26,58	25,73	26,26	4	26,17	*	0,35	110,45
36	A85x	PD02	DB08	30,47	30,92	29,58	30,28	0	30,31	b *	0,56	127,94
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* = non tolerable mean because more than +/-

n Mean S_r CV_r
 all labs 140 23,69 0,312 1,318
 10 % from the mean

I S_R CV_R
 35 1,305 5,510

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: K Sample: 2

Unit: mg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %	
		P	D	1	2	3	4			V _i			
1	F27x	PD01	DB06	4,16	4,81	4,58	4,68	4	4,56	*	0,28	6,24	88,96
2	F33x	PC01	DB10	4,83	4,67	4,60	4,62	4	4,68		0,10	2,23	91,34
3	A57	PZ02	DD02	4,75	4,59	4,59	4,89	4	4,71		0,14	3,07	91,83
4	A62x	PD02	DB06	5,19	4,48	4,69	4,83	4	4,80		0,30	6,22	93,64
5	F26x	PD02	DB09	4,84	4,88	4,86	4,84	4	4,86		0,02	0,39	94,76
6	A36	PD02	DB08	4,95	4,83	4,95	4,75	4	4,87		0,10	2,01	95,05
7	A59	PC01	DB08	4,89	4,88	4,87	4,85	4	4,87		0,02	0,40	95,12
8	F03x	PD02	DB08	5,11	5,12	4,96	4,55	4	4,93		0,27	5,47	96,29
9	F25	PB06	DB08	4,89	5,01	4,97	4,90	4	4,94		0,06	1,16	96,47
10	F08x	PZ99	DB08	4,98	5,06	4,82	4,96	4	4,95		0,10	1,96	96,68
11	A60x	PD01	DB10	4,64	5,08	5,06	5,09	4	4,97		0,22	4,35	96,97
12	A45x	PB99	DB08	4,97	4,96	5,06	5,02	4	5,00		0,05	0,93	97,64
13	A43x	PB06	DB01	5,11	5,17	5,11	4,78	4	5,04		0,18	3,52	98,42
14	F05x	PD02	DB08	5,12	4,98	5,07	5,12	4	5,07		0,07	1,30	99,00
15	F18x	PD99	DB08	5,04	5,20	5,11	5,03	4	5,10		0,08	1,54	99,44
16	F15x	PC01	DB08	5,23	5,10	5,00	5,06	4	5,10		0,10	1,91	99,49
17	F19x	PD02	DB08	5,11	5,11	5,11	5,11	4	5,11		0,00	0,00	99,74
18	A82	PD02	DB08	5,13	5,13	5,11	5,17	4	5,13		0,03	0,54	100,22
19	F16x	PC01	DB08	5,15	5,13	5,15	5,18	4	5,15		0,02	0,34	100,57
20	F21x	PD02	DB09	5,13	5,10	5,27	5,15	4	5,16		0,07	1,44	100,76
21	F07x	PD99	DB08	5,12	5,20	5,19	5,26	4	5,19		0,06	1,11	101,34
22	F01x	PD02	DB01	5,14	5,08	5,23	5,36	4	5,20		0,12	2,34	101,54
23	A65	PD01	DB08	5,27	5,34	5,13	5,23	4	5,24		0,09	1,67	102,32
24	A47	PD01	DB08	5,20	5,70	4,80	5,30	0	5,25	c	0,37	7,04	102,47
25	A85x	PD02	DB08	5,26	4,99	5,51	5,36	4	5,28		0,22	4,14	103,04
26	F12x	PC01	DB08	5,33	5,23	5,29	5,27	4	5,28		0,04	0,79	103,05
27	F14x	PC01	DB08	5,28	5,41	5,21	5,30	4	5,30		0,08	1,56	103,45
28	A88	PD01	DB08	5,32	5,46	5,18	5,32	4	5,32		0,11	2,15	103,82
29	F02x	PD02	DB08	5,41	5,11	5,10	5,66	4	5,32		0,27	5,05	103,84
30	F24x	PD01	DB99	5,08	5,47	5,58	5,26	4	5,35		0,22	4,16	104,37
31	F06x	PD02	DB08	5,31	5,23	5,51	5,38	4	5,36		0,12	2,21	104,61
32	A58	PD02	DB01	5,36	5,64a	5,33	5,40	3	5,36		0,04	0,65	104,68
33	F13x	PD01	DB08	5,53	5,50	5,44	5,50	4	5,49		0,04	0,69	107,20
34	A51	PD02	DB08	5,49	5,45	5,54	5,56	4	5,51		0,05	0,90	107,54
35	F32x	PD01	DB08	5,62	5,43	5,49	5,60	4	5,54		0,09	1,63	108,03
36	F28x	PD02	DB08	5,71	5,67	5,55	5,60	4	5,63		0,07	1,28	109,92
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* = non tolerable mean because more than +/-

n Mean s_r CV_r
 all labs 139 5,12 0,109 2,126
 10 % from the mean

I s_R CV_R
 35 0,255 4,969

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: K

Sample: 3

Unit: mg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		s_i	V_i		
1	F27x	PD01	DB06	4,611a	5,34	5,46	5,43	3	5,41		0,06	92,67
2	A36	PD02	DB08	5,45	5,56	5,44	5,40	4	5,46		0,07	93,51
3	A43x	PB06	DB01	5,42	5,58	5,53	5,69	4	5,56		0,11	95,10
4	F26x	PD02	DB09	5,57	5,56	5,54	5,58	4	5,56		0,02	95,23
5	F08x	PZ99	DB08	5,58	5,55	5,57	5,62	4	5,58		0,03	95,48
6	F21x	PD02	DB09	5,58	5,60	5,63	5,52	4	5,58		0,05	95,57
7	A60x	PD01	DB10	5,72	5,60	5,56	5,69	4	5,64		0,07	96,60
8	A47	PD01	DB08	5,40	5,90	5,40	6,00	0	5,68	c	0,32	97,15
9	A62x	PD02	DB06	5,61	5,80	5,78	5,57	4	5,69		0,12	97,41
10	A59	PC01	DB08	5,62	5,70	5,81	5,70	4	5,71		0,08	97,72
11	A57	PZ02	DD02	5,64	5,73	5,77	5,77	4	5,73		0,06	98,05
12	F03x	PD02	DB08	5,70	5,74	5,77	5,82	4	5,76		0,05	98,60
13	F02x	PD02	DB08	5,98	5,65	5,66	5,75	4	5,76		0,15	98,61
14	F33x	PC01	DB10	5,71	5,78	5,62	6,04	4	5,79		0,18	99,08
15	F15x	PC01	DB08	5,81	5,85	5,71	5,81	4	5,80		0,06	99,21
16	F18x	PD99	DB08	5,85	5,87	5,75	5,79	4	5,82		0,06	99,55
17	F07x	PD99	DB08	5,79	5,78	5,86	5,86	4	5,82		0,04	99,65
18	F12x	PC01	DB08	5,87	5,88	6,02	5,52	4	5,82		0,21	99,68
19	F16x	PC01	DB08	5,91	5,74	5,85	5,80	4	5,83		0,07	99,72
20	A82	PD02	DB08	5,80	5,78	5,88	5,94	4	5,85		0,07	100,12
21	A65	PD01	DB08	5,81	5,80	5,73	6,09	4	5,86		0,16	100,28
22	F19x	PD02	DB08	5,88	5,88	5,88	5,88	4	5,88		0,00	100,66
23	F24x	PD01	DB99	5,70	5,86	5,99	6,01	4	5,89		0,14	100,83
24	F01x	PD02	DB01	5,90	5,85	5,83	6,02	4	5,90		0,09	101,00
25	F25	PB06	DB08	5,86	5,88	5,97	5,90	4	5,90		0,05	101,05
26	A45x	PB99	DB08	5,91	5,94	5,90	5,92	4	5,92		0,02	101,30
27	F14x	PC01	DB08	6,01	5,94	5,90	5,92	4	5,94		0,05	101,73
28	A85x	PD02	DB08	6,11	6,22	5,88	5,96	4	6,04		0,15	103,43
29	F06x	PD02	DB08	6,09	6,11	6,12	6,08	4	6,10		0,02	104,43
30	F13x	PD01	DB08	6,12	6,13	6,11	6,19	4	6,14		0,04	105,07
31	A88	PD01	DB08	6,18	6,08	6,27	6,18	4	6,18		0,08	105,77
32	F28x	PD02	DB08	6,19	6,28	6,06	6,22	4	6,19		0,09	105,92
33	F05x	PD02	DB08	6,22	6,20	6,22	6,23	4	6,22		0,01	106,44
34	A58	PD02	DB01	6,63	5,93	6,46	6,35	0	6,34	c	0,30	108,58
35	A51	PD02	DB08	6,28	6,38	6,40	6,34	4	6,35		0,05	108,71
36	F32x	PD01	DB08	6,81	6,68	6,80	6,76	0	6,76	b *	0,06	115,77
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* = non tolerable mean because more than +/-

n Mean s_r CV_r
 all labs 131 5,84 0,076 1,302
 10 % from the mean

I s_R CV_R
 33 0,223 3,820

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: K Sample: 4

Unit: mg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev.	Recovery	
		P	D	1	2	3	4		s _i	V _i	%		
1	A85x	PD02	DB08	8,19	7,90	7,99	8,09	4	8,04		0,12	1,55	90,46
2	F27x	PD01	DB06	8,28	8,29	8,18	8,21	4	8,24		0,05	0,63	92,73
3	A60x	PD01	DB10	8,42	8,37	8,40	8,41	4	8,40		0,02	0,28	94,50
4	A43x	PB06	DB01	8,51	8,46	8,19	8,72	4	8,47		0,22	2,57	95,30
5	A58	PD02	DB01	8,49	8,60	8,53	8,02a	3	8,54		0,06	0,65	96,09
6	F21x	PD02	DB09	8,59	8,54	8,58	8,61	4	8,58		0,03	0,34	96,54
7	F26x	PD02	DB09	8,67	8,65	8,68	8,64	4	8,66		0,02	0,21	97,44
8	F28x	PD02	DB08	8,42	9,00	8,88	8,62	4	8,73		0,26	3,01	98,23
9	F03x	PD02	DB08	8,85	8,81	8,95	8,40	4	8,75		0,24	2,78	98,46
10	A45x	PB99	DB08	8,77	8,81	8,66	8,77	4	8,75		0,06	0,74	98,48
11	A57	PZ02	DD02	8,82	8,75	8,71	8,76	4	8,76		0,05	0,52	98,56
12	F18x	PD99	DB08	8,75	8,78	8,80	8,74	4	8,77		0,03	0,31	98,65
13	A59	PC01	DB08	8,77	8,74	8,80	8,78	4	8,77		0,02	0,27	98,71
14	A36	PD02	DB08	8,85	8,71	8,67	8,91	4	8,79		0,11	1,29	98,84
15	A62x	PD02	DB06	8,73	8,41	8,55	9,49	0	8,80	c	0,48	5,47	98,96
16	F25	PB06	DB08	8,79	8,78	8,86	8,79	4	8,81		0,04	0,42	99,07
17	A47	PD01	DB08	9,00	8,50	8,70	9,20	4	8,85		0,31	3,51	99,58
18	F33x	PC01	DB10	9,05	8,96	8,76	8,63	4	8,85		0,19	2,15	99,58
19	A65	PD01	DB08	8,90	8,84	8,85	8,88	4	8,87		0,03	0,31	99,77
20	F15x	PC01	DB08	8,83	8,90	8,86	8,90	4	8,87		0,03	0,38	99,83
21	F01x	PD02	DB01	8,89	8,82	8,74	9,06	4	8,88		0,14	1,53	99,89
22	F16x	PC01	DB08	8,92	8,94	8,96	8,80	4	8,90		0,07	0,80	100,17
23	F05x	PD02	DB08	8,93	8,92	8,95	8,96	4	8,94		0,02	0,20	100,59
24	F24x	PD01	DB99	8,46	9,02	9,17	9,12	4	8,94		0,33	3,66	100,62
25	F08x	PZ99	DB08	9,24	9,00	8,85	8,70	4	8,94		0,23	2,60	100,63
26	F02x	PD02	DB08	9,12	9,21	8,82	8,68	4	8,96		0,25	2,78	100,79
27	F14x	PC01	DB08	9,10	9,00	9,00	9,00	4	9,03		0,05	0,55	101,54
28	F06x	PD02	DB08	9,38	8,86	9,18	9,11	4	9,13		0,21	2,34	102,75
29	F07x	PD99	DB08	9,02	9,28	9,09	9,20	4	9,15		0,12	1,26	102,90
30	F19x	PD02	DB08	9,17	9,17	9,17	9,17	4	9,17		0,00	0,00	103,18
31	A82	PD02	DB08	9,25	9,24	9,26	9,22	4	9,24		0,02	0,20	104,02
32	F12x	PC01	DB08	9,31	9,21	9,44	9,31	4	9,32		0,09	1,01	104,84
33	A88	PD01	DB08	9,33	9,26	9,41	9,33	4	9,33		0,06	0,65	105,01
34	F13x	PD01	DB08	9,37	9,38	9,32	9,33	4	9,35		0,03	0,31	105,20
35	A51	PD02	DB08	9,65	9,44	9,50	9,43	4	9,51		0,10	1,07	106,95
36	F32x	PD01	DB08	9,80	9,81	9,66	9,53	4	9,70		0,13	1,37	109,14
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n Mean S_r CV_r
 all labs 139 8,89 0,107 1,206

* = non tolerable mean because more than +/-

10 % from the mean

I S_R CV_R
 35 0,341 3,835

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: C Sample: 1

Unit: g/100g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		V _i			
1	A57	PZ98	DA01	45,11	45,06	45,20	45,60	4	45,24		0,25	95,79
2	F13x	PZ98	DA01	44,90	45,40	45,60	45,70	4	45,40		0,36	96,12
3	A59	PZ98	DA02	45,63	45,61	45,59	45,55	4	45,60		0,03	96,53
4	A86	PZ98	DA01	45,55	45,87	45,59	45,44	4	45,61		0,18	96,57
5	F02x	PZ98	DA01	46,23	46,23	46,32	46,01	4	46,20		0,13	97,81
6	F06x	PZ98	DA02	46,15	46,16	46,36	46,33	4	46,25		0,11	97,92
7	F18x	PZ98	DA01	46,60	46,40	47,00	46,80	4	46,70		0,26	98,87
8	F33x	PZ98	DA02	46,90	46,50	46,30	47,40	4	46,78		0,49	99,03
9	A85x	PZ98	DA01	46,69	46,65	46,78	47,07	4	46,80		0,19	99,08
10	A82	PZ98	DA02	47,18	46,78	47,10	47,01	4	47,02		0,17	99,54
11	F21x	PZ98	DA01	47,11	47,05	47,04	47,10	4	47,08		0,04	99,66
12	F15x	PZ98	DA01	47,20	47,04	47,08	46,98	4	47,08		0,09	99,66
13	A58	PZ98	DA02	47,07	47,07	47,04	47,16	4	47,09		0,05	99,69
14	F19x	PZ98	DA01	47,10	47,10	47,10	47,10	4	47,10		0,00	99,72
15	A45x	PZ98	DA02	47,10	47,00	47,10	47,30	4	47,13		0,13	99,77
16	F03x	PZ98	DA01	46,99	47,20	47,31	47,27	4	47,19		0,14	99,91
17	F28x	PZ98	DA02	47,15	47,25	47,15	47,25	4	47,20		0,06	99,93
18	F07x	PZ98	DA01	47,19	47,33	47,20	47,29	4	47,25		0,07	100,04
19	A65	PZ98	DA02	47,08	47,16	47,61	47,41	4	47,32		0,24	100,18
20	A61x	PZ98	DA02	47,36	47,37	47,38	47,23	4	47,34		0,07	100,22
21	F24x	PZ98	DA02	47,22	47,36	47,55	47,38	4	47,38		0,14	100,31
22	F05x	PZ98	DA01	47,40	47,40	47,40	47,40	4	47,40		0,00	100,35
23	F25	PZ98	DA01	47,46	47,48	47,44	47,45	4	47,46		0,02	100,47
24	F08x	PZ98	DA01	47,95	47,93	47,47	47,34	4	47,67		0,32	100,93
25	F26x	PZ98	DA01	47,60	47,60	47,80	47,70	4	47,68		0,10	100,94
26	F16x	PZ98	DA02	47,76	47,42	47,84	47,75	4	47,69		0,19	100,97
27	F12x	PZ98	DA02	47,85	47,51	47,40	48,07	4	47,71		0,31	101,00
28	F27x	PZ98	DA01	47,79	47,66	47,68	47,73	4	47,72		0,06	101,02
29	F14x	PZ98	DA01	47,40	47,60	47,90	48,00	4	47,73		0,28	101,04
30	A60x	PZ98	DA02	47,81	47,96	47,60	47,76	4	47,78		0,15	101,16
31	A88	PZ98	DA01	48,52	48,18	48,13	48,31	4	48,29		0,17	102,23
32	A62x	PZ98	DA01	49,30	48,00	48,00	47,90	0	48,30	c	0,67	102,26
33	A51	PZ98	DA02	48,30	48,50	48,50	48,60	4	48,48		0,13	102,63
34	F32x	PZ98	DA01	49,60	49,50	49,70	49,60	4	49,60	*	0,08	105,01
35	A47	PZ98	DA02	50,30	49,83	50,04	49,91	4	50,02	*	0,21	105,90
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* = non tolerable mean because more than +/-

n Mean S_r CV_r
 all labs 136 47,23 0,152 0,322

5 % from the mean

I S_R CV_R
 34 1,004 2,125

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: C Sample: 2

Unit: g/100g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		V _i			
1	A59	PZ98	DA02	47,26	47,34	46,99	47,09	4	47,17		0,16	95,83
2	F33x	PZ98	DA02	47,80	48,80	46,90	46,80	4	47,58		0,93	96,66
3	A57	PZ98	DA01	47,71	47,68	47,58	47,85	4	47,71		0,11	96,92
4	F02x	PZ98	DA01	48,05	48,32	47,62	47,56	4	47,89		0,36	97,29
5	A86	PZ98	DA01	47,92	47,84	47,95	47,88	4	47,90		0,05	97,31
6	F06x	PZ98	DA02	47,90	47,98	47,91	48,16	4	47,99		0,12	97,49
7	F28x	PZ98	DA02	48,07	48,17	48,27	48,17	4	48,17		0,08	97,87
8	F13x	PZ98	DA01	48,00	48,20	48,20	48,30	4	48,18		0,13	97,88
9	A58	PZ98	DA02	48,43	48,40	48,60	48,77	4	48,55		0,17	98,64
10	F21x	PZ98	DA01	48,55	48,57	48,82	48,56	4	48,63		0,13	98,79
11	F15x	PZ98	DA01	48,81	48,67	48,61	48,65	4	48,69		0,09	98,91
12	A45x	PZ98	DA02	49,10	48,70	48,70	48,70	4	48,80		0,20	99,15
13	F03x	PZ98	DA01	48,94	49,09	49,00	49,27	4	49,08		0,14	99,70
14	F05x	PZ98	DA01	49,20	49,20	49,20	49,10	4	49,18		0,05	99,91
15	A82	PZ98	DA02	48,38	48,64	48,35	51,44	0	49,20	c	1,50	99,96
16	A61x	PZ98	DA02	49,17	49,39	49,34	49,09	4	49,25		0,14	100,05
17	F14x	PZ98	DA01	49,60	49,50	49,60	48,80	4	49,38		0,39	100,31
18	F07x	PZ98	DA01	49,51	49,42	49,26	49,42	4	49,40		0,11	100,37
19	A65	PZ98	DA02	49,38	49,41	49,28	49,61	4	49,42		0,14	100,40
20	F19x	PZ98	DA01	49,50	49,50	49,50	49,50	4	49,50		0,00	100,57
21	A62x	PZ98	DA01	50,50	50,00	48,80	48,80	4	49,53		0,86	100,62
22	F24x	PZ98	DA02	49,42	49,59	49,64	49,55	4	49,55		0,09	100,67
23	A85x	PZ98	DA01	50,01	49,41	49,36	49,76	4	49,63		0,31	100,84
24	F08x	PZ98	DA01	49,74	50,04	49,60	49,37	4	49,69		0,28	100,95
25	F16x	PZ98	DA02	49,68	49,73	49,79	49,66	4	49,72		0,06	101,00
26	F25	PZ98	DA01	49,88	49,77	49,70	49,67	4	49,76		0,09	101,09
27	F26x	PZ98	DA01	49,70	49,80	49,80	49,90	4	49,80		0,08	101,18
28	F18x	PZ98	DA01	50,20	49,60	50,20	49,20	4	49,80		0,49	101,18
29	F12x	PZ98	DA02	50,19	50,21	50,62	50,12	4	50,29		0,23	102,16
30	A60x	PZ98	DA02	50,10	50,43	50,37	50,27	4	50,29		0,14	102,18
31	A88	PZ98	DA01	49,94	51,32	50,18	50,34	4	50,44		0,61	102,48
32	F27x	PZ98	DA01	50,46	50,45	50,58	50,65	4	50,54		0,10	102,67
33	A51	PZ98	DA02	50,90	51,00	51,20	50,90	4	51,00		0,14	103,61
34	A47	PZ98	DA02	51,54	52,04	51,96	51,84	4	51,85	*	0,22	105,33
35	F32x	PZ98	DA01	52,70	52,80	52,90	52,70	0	52,78	b *	0,10	107,22
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* = non tolerable mean because more than +/-

n Mean S_r CV_r
 all labs 132 49,22 0,218 0,443
 5 % from the mean

I S_R CV_R
 33 1,050 2,133

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: C Sample: 3

Unit: g/100g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4			V _i		
1	A59	PZ98	DA02	49,90	49,59	49,71	49,91	4	49,78		0,16	95,61
2	A86	PZ98	DA01	50,43	50,26	50,51	49,88	4	50,27		0,28	96,55
3	A57	PZ98	DA01	50,39	50,55	50,26	50,33	4	50,38		0,12	96,77
4	F13x	PZ98	DA01	50,50	50,80	50,70	50,40	4	50,60		0,18	97,19
5	F33x	PZ98	DA02	51,10	51,00	50,80	50,90	4	50,95		0,13	97,86
6	F02x	PZ98	DA01	50,55	51,18	51,07	51,54	4	51,09		0,41	98,12
7	A82	PZ98	DA02	51,38	50,62	51,34	51,65	4	51,25		0,44	98,43
8	A58	PZ98	DA02	51,26	51,24	51,34	51,33	4	51,29		0,05	98,52
9	F15x	PZ98	DA01	51,33	51,57	51,37	51,55	4	51,46		0,12	98,83
10	F06x	PZ98	DA02	51,56	51,74	51,57	51,34	4	51,55		0,16	99,01
11	F19x	PZ98	DA01	51,70	51,70	51,70	51,70	4	51,70		0,00	99,30
12	A45x	PZ98	DA02	51,70	51,60	51,90	52,00	4	51,80		0,18	99,49
13	F07x	PZ98	DA01	51,76	51,87	51,69	51,99	4	51,83		0,13	99,54
14	A85x	PZ98	DA01	51,93	51,86	51,80	51,78	4	51,84		0,07	99,57
15	F18x	PZ98	DA01	51,80	52,10	51,80	51,70	4	51,85		0,17	99,59
16	F03x	PZ98	DA01	52,00	51,53	51,68	52,19	4	51,85		0,30	99,59
17	F16x	PZ98	DA02	51,65	52,18	52,03	52,11	4	51,99		0,24	99,86
18	F05x	PZ98	DA01	52,20	52,20	52,20	52,20	4	52,20		0,00	100,26
19	F21x	PZ98	DA01	52,22	52,19	52,16	52,39	4	52,24		0,10	100,34
20	F28x	PZ98	DA02	52,22	52,43	52,12	52,43	4	52,30		0,16	100,45
21	F24x	PZ98	DA02	52,08	52,40	52,47	52,32	4	52,32		0,17	100,48
22	F12x	PZ98	DA02	51,94	52,88	52,52	51,93	4	52,32		0,47	100,48
23	A61x	PZ98	DA02	52,07	52,87	52,36	52,16	4	52,37		0,36	100,58
24	A65	PZ98	DA02	52,26	52,83	52,23	52,24	4	52,39		0,29	100,62
25	F14x	PZ98	DA01	52,40	52,50	52,50	52,40	4	52,45		0,06	100,74
26	F25	PZ98	DA01	52,48	52,45	52,42	52,46	4	52,45		0,02	100,74
27	F08x	PZ98	DA01	52,61	52,65	52,39	52,41	4	52,52		0,13	100,86
28	F26x	PZ98	DA01	52,80	52,90	52,90	52,70	4	52,83		0,10	101,46
29	A88	PZ98	DA01	52,68	53,85	52,72	52,25	0	52,87	c	0,69	101,55
30	A51	PZ98	DA02	52,80	53,30	53,50	53,00	4	53,15		0,31	102,08
31	A60x	PZ98	DA02	53,25	53,19	53,14	53,10	4	53,17		0,06	102,12
32	F27x	PZ98	DA01	53,29	53,21	53,45	53,27	4	53,31		0,10	102,38
33	A62x	PZ98	DA01	54,10	53,90	54,20	54,10	4	54,08		0,13	103,86
34	A47	PZ98	DA02	54,13	54,07	53,93	54,69	4	54,21		0,33	104,11
35	F32x	PZ98	DA01	54,20	54,50	54,70	54,50	4	54,48		0,21	104,63
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* = non tolerable mean because more than +/-

all labs	n	Mean	s_r	CV_r
	136	52,07	0,181	0,347
	5	% from the mean		
	I		s_R	CV_R
	34		1,070	2,056

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: C Sample: 4

Unit: g/100g

No.	Lab. Code	Method code P D	Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %		
			1	2	3	4		b	*	V_i			
1	F14x	PZ98	DA01	44,80	43,60	44,80	45,90	0	44,78	b *	0,94	2,10	86,77
2	A57	PZ98	DA01	49,91	49,74	49,65	49,95	4	49,81		0,14	0,28	96,54
3	F02x	PZ98	DA01	49,58	50,10	49,75	49,90	4	49,83		0,22	0,44	96,57
4	A86	PZ98	DA01	49,89	49,82	49,82	49,89	4	49,86		0,04	0,08	96,62
5	A59	PZ98	DA02	49,97	49,86	50,11	49,80	4	49,94		0,14	0,27	96,77
6	F13x	PZ98	DA01	50,30	50,60	50,30	49,30	4	50,13		0,57	1,13	97,14
7	F18x	PZ98	DA01	50,70	50,60	51,10	50,60	4	50,75		0,24	0,47	98,35
8	F24x	PZ98	DA02	50,73	50,89	50,95	50,86	4	50,86		0,09	0,18	98,56
9	A82	PZ98	DA02	51,16	51,11	51,13	51,11	4	51,13		0,02	0,05	99,08
10	F19x	PZ98	DA01	51,20	51,20	51,20	51,20	4	51,20		0,00	0,00	99,22
11	F33x	PZ98	DA02	50,80	51,10	51,20	52,00	4	51,28		0,51	1,00	99,37
12	F06x	PZ98	DA02	51,07	51,15	51,23	51,73	4	51,30		0,30	0,58	99,41
13	A45x	PZ98	DA02	51,20	51,30	51,40	51,30	4	51,30		0,08	0,16	99,42
14	F15x	PZ98	DA01	51,34	51,37	51,35	51,33	4	51,35		0,02	0,03	99,51
15	F21x	PZ98	DA01	51,34	51,40	51,45	51,29	4	51,37		0,07	0,14	99,55
16	F07x	PZ98	DA01	51,51	51,31	51,29	51,49	4	51,40		0,12	0,23	99,61
17	F03x	PZ98	DA01	51,12	51,33	51,35	51,87	4	51,42		0,32	0,62	99,65
18	A85x	PZ98	DA01	51,35	51,59	51,58	51,61	4	51,53		0,12	0,23	99,87
19	A61x	PZ98	DA02	51,42	51,47	51,59	51,65	4	51,53		0,11	0,21	99,87
20	F08x	PZ98	DA01	52,04	51,79	50,83	51,63	4	51,57		0,52	1,02	99,95
21	F05x	PZ98	DA01	51,60	51,70	51,60	51,60	4	51,63		0,05	0,10	100,05
22	A60x	PZ98	DA02	52,04	51,60	51,95	51,51	4	51,78		0,26	0,50	100,34
23	F28x	PZ98	DA02	51,82	51,72	51,62	52,02	4	51,80		0,17	0,33	100,38
24	A58	PZ98	DA02	51,83	51,78	51,68	51,94	4	51,81		0,11	0,21	100,40
25	A65	PZ98	DA02	51,61	51,70	52,13	51,96	4	51,85		0,24	0,46	100,48
26	F25	PZ98	DA01	52,00	51,94	51,87	51,84	4	51,91		0,07	0,14	100,61
27	F16x	PZ98	DA02	52,16	52,09	51,85	51,91	4	52,00		0,15	0,28	100,78
28	F12x	PZ98	DA02	52,18	52,02	52,28	52,31	4	52,20		0,13	0,25	101,16
29	F26x	PZ98	DA01	52,20	52,40	52,20	52,20	4	52,25		0,10	0,19	101,26
30	F27x	PZ98	DA01	52,67	52,77	52,67	52,74	4	52,71		0,05	0,10	102,16
31	A88	PZ98	DA01	53,00	52,94	52,80	52,32	4	52,77		0,31	0,58	102,26
32	A51	PZ98	DA02	52,80	52,80	52,90	52,80	4	52,83		0,05	0,09	102,37
33	A62x	PZ98	DA01	53,30	53,10	53,20	52,50	4	53,03		0,36	0,68	102,76
34	F32x	PZ98	DA01	54,00	53,80	54,00	53,70	4	53,88		0,15	0,28	104,41
35	A47	PZ98	DA02	54,57	54,43	54,51	54,28	4	54,45	*	0,13	0,23	105,52
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* = non tolerable mean because more than +/-

n Mean S_r CV_r
 all labs 136 51,60 0,175 0,339
 5 % from the mean

I S_R CV_R
 34 1,060 2,054

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Zn Sample: 1

Unit: µg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %	
		P	D	1	2	3	4		V _i				
1	F27	PD01	DB01	11,61	12,92	10,55	11,52	4	11,65		0,97	8,35	82,41
2	F32x	PD01	DB08	11,60	11,70	11,70	11,60	4	11,65		0,06	0,50	82,41
3	F08x	PE99	DB08	11,87	11,73	12,20	12,10	4	11,97		0,22	1,81	84,70
4	F19x	PD02	DB08	12,60	12,60	12,60	12,60	4	12,60		0,00	0,00	89,13
5	F12x	PC01	DB10	12,60	12,67	12,86	12,82	4	12,74		0,12	0,98	90,10
6	A57	PZ02	DD02	13,20	12,90	12,80	13,60	4	13,13		0,36	2,74	92,84
7	F02x	PD02	DB08	12,85	13,64	12,87	13,23	4	13,15		0,37	2,83	93,00
8	F25	PB06	DB08	13,57	13,43	13,55	13,57	4	13,53		0,07	0,50	95,71
9	A59	PC01	DB08	13,74	13,85	13,80	13,72	4	13,78		0,06	0,43	97,46
10	F05x	PD02	DB08	13,90	13,70	13,90	13,80	4	13,83		0,10	0,69	97,80
11	A45x	PB99	DB08	14,20	13,70	13,70	14,00	4	13,90		0,24	1,76	98,33
12	A36	PD02	DB08	14,35	13,71	13,71	14,03	4	13,95		0,31	2,20	98,68
13	F07x	PD99	DB08	14,12	13,83	14,46	13,89	4	14,08		0,29	2,03	99,56
14	A82	PD01	DB08	13,08	14,23	14,53	14,83	4	14,17		0,77	5,40	100,22
15	A65	PD01	DB08	13,80	14,80	14,30	14,20	4	14,28		0,41	2,88	100,98
16	F33	PD01	DB10	13,78	14,23	14,94	15,30	4	14,56		0,69	4,71	103,01
17	F14x	PC01	DB08	14,70	14,40	14,80	14,40	4	14,58		0,21	1,41	103,10
18	F15x	PC01	DB08	14,90	14,30	14,70	14,70	4	14,65		0,25	1,72	103,63
19	A60x	PD01	DB10	14,78	14,59	15,10	15,26	4	14,93		0,30	2,03	105,64
20	F06	PD02	DB08	15,30	14,50	15,20	15,00	4	15,00		0,36	2,37	106,11
21	F13x	PD01	DB08	15,50	15,00	15,40	14,50	4	15,10		0,45	3,01	106,81
22	A80	PD01	DB10	15,20	15,10	15,00	15,10	4	15,10		0,08	0,54	106,81
23	F28x	PD02	DB08	15,83	15,12	14,53	15,47	4	15,24		0,55	3,63	107,79
24	A51	PD02	DB08	16,40	15,10	15,40	14,20	4	15,28		0,91	5,94	108,05
25	F16x	PC01	DB08	15,22	15,36	15,68	15,21	4	15,37		0,22	1,43	108,71
26	F03x	PD02	DB08	15,42	16,88	16,07	15,54	4	15,98		0,66	4,16	113,02
27	A58	PD02	DB01	16,20	17,25a	15,90	16,12	3	16,07		0,16	0,97	113,70
28	F18x	PD99	DB10	17,20	14,20	16,60	16,30	4	16,08		1,30	8,12	113,71
29	A88	PD01	DB08	18,88	21,08	16,68	18,88	0	18,88	b *	1,80	9,51	133,55
30	F24x	PD01	DB99	20,00	25,00	11,00	61,00	0	29,25	b *	21,95	75,03	206,91
31	A47	PC01	DB08	48,00	43,00	51,00	45,00	0	46,75	b *	3,50	7,49	330,70
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* = non tolerable mean because more than +/-

n Mean S_r CV_r
 all labs 111 14,14 0,374 2,648
 20 % from the mean

Limit for the lower concentration range

I S_R CV_R
 28 1,260 8,902

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Zn Sample: 2

Unit: µg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		Lab.mean	V_i		
1	F08x	PE99	DB08	35,46	35,83	35,67	36,34	4	35,82	*	0,37	82,94
2	F27	PD01	DB01	38,29	40,42	38,05	41,00	4	39,44		1,49	91,32
3	A45x	PB99	DB08	39,70	41,00	39,40	39,70	4	39,95		0,71	92,50
4	A57	PZ02	DD02	39,00	40,30	38,80	42,00	4	40,03		1,48	92,67
5	A36	PD02	DB08	39,63	41,98	41,13	40,06	4	40,70		1,06	94,23
6	F33	PD01	DB10	40,51	42,85	41,12	38,37	4	40,71		1,85	94,26
7	F07x	PD99	DB08	40,83	41,99	40,42	41,00	4	41,06		0,67	95,07
8	F19x	PD02	DB08	41,20	41,20	41,20	41,20	4	41,20		0,00	95,39
9	F12x	PC01	DB10	41,38	41,23	41,30	41,30	4	41,30		0,06	95,63
10	F32x	PD01	DB08	42,10	40,70	41,60	41,70	4	41,53		0,59	96,14
11	F18x	PD99	DB10	42,40	44,30	41,60	40,90	4	42,30		1,47	97,94
12	F05x	PD02	DB08	42,20	42,10	42,70	43,20	4	42,55		0,51	98,52
13	F03x	PD02	DB08	43,68	41,74	41,41	44,88	4	42,93		1,64	99,39
14	A80	PD01	DB10	43,30	42,80	43,00	43,50	4	43,15		0,31	99,91
15	F28x	PD02	DB08	41,07	42,40	45,73	43,86	4	43,27		2,00	100,17
16	F14x	PC01	DB08	42,80	45,20	44,30	41,80	4	43,53		1,52	100,77
17	A60x	PD01	DB10	46,31	45,38	42,10	41,08	4	43,72		2,52	101,22
18	A51	PD02	DB08	45,60	44,60	41,80	43,00	4	43,75		1,68	101,29
19	A59	PC01	DB08	43,86	44,90	43,60	42,78	4	43,79		0,87	101,38
20	A82	PD01	DB08	43,88	45,58	44,35	43,31	4	44,28		0,97	102,52
21	F15x	PC01	DB08	43,30	45,50	45,60	45,90	4	45,08		1,20	104,36
22	F13x	PD01	DB08	45,00	44,60	45,30	46,20	4	45,28		0,68	104,83
23	F25	PB06	DB08	44,07	45,26	45,91	46,90	4	45,54		1,19	105,43
24	A65	PD01	DB08	49,00	47,10	44,30	43,30	4	45,93		2,61	106,33
25	A88	PD01	DB08	46,11	47,90	44,31	46,11	4	46,11		1,47	106,75
26	F16x	PC01	DB08	46,18	46,07	46,59	45,87	4	46,18		0,30	106,91
27	F02x	PD02	DB08	45,57	48,39	40,19	51,20	4	46,34		4,70	107,29
28	A58	PD02	DB01	47,35	46,03	47,85	45,10	4	46,58		1,25	107,85
29	A47	PC01	DB08	48,00	51,00	43,00	45,00	4	46,75		3,50	108,24
30	F06	PD02	DB08	48,00	45,00	47,10	47,80	4	46,98		1,37	108,76
31	F24x	PD01	DB99	61,00	71,00	53,00	78,00	0	65,75	b *	11,00	152,23
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* = non tolerable mean because more than +/-

n Mean S_r CV_r
 all labs 120 43,19 1,334 3,089
 15 % from the mean

I S_R CV_R
 30 2,667 6,175

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Zn Sample: 3

Unit: µg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		b^*	V_i		
1	A47	PC01	DB08	25,00	24,00	24,00	22,00	0	23,75	b^*	1,26	48,62
2	F12x	PC01	DB10	43,15	43,57	43,78	40,753a	3	43,50	0,32	0,74	89,05
3	F19x	PD02	DB08	44,00	44,00	44,00	44,00	4	44,00	0,00	0,00	90,07
4	A58	PD02	DB01	47,22	43,49	44,28	47,58	4	45,64	2,06	4,51	93,43
5	F08x	PE99	DB08	45,76	45,52	45,91	46,67	4	45,97	0,50	1,08	94,09
6	A36	PD02	DB08	45,95	46,37	46,37	45,32	4	46,00	0,50	1,08	94,17
7	F27	PD01	DB01	43,79	49,66	46,56	44,02	4	46,01	2,74	5,95	94,18
8	A59	PC01	DB08	46,87	46,49	46,07	46,60	4	46,51	0,33	0,71	95,20
9	F07x	PD99	DB08	46,41	47,84	46,59	46,16	4	46,75	0,75	1,60	95,70
10	F32x	PD01	DB08	46,80	47,40	47,10	47,20	4	47,13	0,25	0,53	96,47
11	F28x	PD02	DB08	47,77	46,69	48,96	45,53	4	47,24	1,47	3,11	96,70
12	A45x	PB99	DB08	47,20	47,00	47,70	47,10	4	47,25	0,31	0,66	96,72
13	F05x	PD02	DB08	47,80	47,10	46,90	47,50	4	47,33	0,40	0,85	96,88
14	F03x	PD02	DB08	48,16	49,10	49,66	46,16	4	48,27	1,54	3,18	98,81
15	F16x	PC01	DB08	48,39	48,78	49,25	49,88	4	49,08	0,64	1,31	100,46
16	F14x	PC01	DB08	49,90	49,50	48,90	49,00	4	49,33	0,46	0,94	100,97
17	F33	PD01	DB10	50,34	48,83	47,79	50,58	4	49,39	1,32	2,66	101,09
18	A60x	PD01	DB10	50,72	48,49	50,36	50,05	4	49,91	0,98	1,96	102,16
19	A65	PD01	DB08	51,50	49,60	49,90	49,30	4	50,08	0,98	1,96	102,51
20	F02x	PD02	DB08	47,84	49,37	50,52	53,06	4	50,20	2,20	4,39	102,76
21	A80	PD01	DB10	50,30	50,70	50,00	50,30	4	50,33	0,29	0,57	103,02
22	F18x	PD99	DB10	51,20	51,10	50,50	49,30	4	50,53	0,87	1,73	103,43
23	A82	PD01	DB08	50,09	51,19	49,82	51,05	4	50,54	0,68	1,35	103,45
24	A51	PD02	DB08	51,90	50,40	50,10	50,60	4	50,75	0,79	1,56	103,89
25	F06	PD02	DB08	52,20	51,40	52,20	50,80	4	51,65	0,68	1,32	105,73
26	F13x	PD01	DB08	51,50	51,00	53,00	51,80	4	51,83	0,85	1,64	106,09
27	F15x	PC01	DB08	52,20	52,70	52,00	51,10	4	52,00	0,67	1,29	106,45
28	A57	PZ02	DD02	51,20	52,50	52,30	53,00	4	52,25	0,76	1,45	106,96
29	A88	PD01	DB08	52,78	53,06	52,51	52,78	4	52,78	0,22	0,43	108,05
30	F25	PB06	DB08	52,91	52,82	53,69	53,14	4	53,14	0,39	0,74	108,78
31	F24x	PD01	DB99	70,00	71,00	49,00	60,00	0	62,50	b^*	10,28	16,45
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* = non tolerable mean because more than +/-

n Mean S_r CV_r
 all labs 115 48,85 0,826 1,691
 15 % from the mean

I S_R CV_R
 29 2,646 5,422

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Zn Sample: 4

Unit: µg/g

No.	Lab. Code	Method code P	Method code D	Replications				n	Lab.mean		Lab.standard dev.	Recovery	
				1	2	3	4		s _i	V _i	%		
1	F08x	PE99	DB08	16,87	17,20	16,69	16,68	0	16,86	b *	0,24	1,44	76,57
2	F27	PD01	DB01	20,66	14,65	19,93	16,89	4	18,03	b *	2,78	15,44	81,88
3	F32x	PD01	DB08	19,60	19,40	19,50	19,40	4	19,48		0,10	0,49	88,43
4	F19x	PD02	DB08	19,60	19,60	19,60	19,60	4	19,60		0,00	0,00	89,00
5	F12x	PC01	DB10	20,90	20,47	21,19	21,13	4	20,92		0,33	1,56	95,00
6	A45x	PB99	DB08	21,00	21,30	21,20	20,90	4	21,10		0,18	0,87	95,81
7	F07x	PD99	DB08	21,12	21,59	20,87	21,30	4	21,22		0,30	1,43	96,36
8	A57	PZ02	DD02	21,10	21,30	21,00	21,50	4	21,23		0,22	1,04	96,38
9	A36	PD02	DB08	21,20	21,09	22,04	21,30	4	21,41		0,43	2,01	97,21
10	A58	PD02	DB01	21,83	21,43	20,46	22,33	4	21,51		0,79	3,68	97,68
11	F02x	PD02	DB08	22,02	21,59	21,40	21,31	4	21,58		0,32	1,46	97,99
12	F28x	PD02	DB08	21,53	21,76	22,01	21,29	4	21,65		0,31	1,43	98,30
13	F05x	PD02	DB08	21,70	21,80	21,80	21,90	4	21,80		0,08	0,37	98,99
14	A82	PD01	DB08	21,66	22,37	22,03	21,63	4	21,92		0,35	1,59	99,55
15	A59	PC01	DB08	21,71	21,90	21,96	22,14	4	21,93		0,18	0,81	99,57
16	F33	PD01	DB10	22,95	22,55	21,72	21,50	4	22,18		0,68	3,08	100,72
17	F14x	PC01	DB08	22,30	22,20	22,40	22,30	4	22,30		0,08	0,37	101,26
18	A60x	PD01	DB10	22,52	21,88	22,87	22,02	4	22,32		0,46	2,04	101,35
19	A65	PD01	DB08	22,50	22,60	22,60	22,10	4	22,45		0,24	1,06	101,94
20	A51	PD02	DB08	21,80	23,20	22,90	22,40	4	22,58		0,61	2,72	102,51
21	F15x	PC01	DB08	22,30	22,70	22,70	23,60	4	22,83		0,55	2,41	103,64
22	F16x	PC01	DB08	22,80	22,67	23,38	22,83	4	22,92		0,31	1,37	104,08
23	F25	PB06	DB08	22,74	23,38	22,31	23,31	4	22,94		0,51	2,21	104,14
24	F18x	PD99	DB10	22,40	23,60	23,00	23,00	4	23,00		0,49	2,13	104,44
25	F06	PD02	DB08	23,40	22,60	23,40	22,70	4	23,03		0,43	1,89	104,55
26	A80	PD01	DB10	23,90	23,10	23,30	23,00	4	23,33		0,40	1,73	105,92
27	F03x	PD02	DB08	24,34	24,25	24,29	23,86	4	24,19		0,22	0,91	109,82
28	A88	PD01	DB08	24,54	23,15	25,93	24,54	4	24,54		1,13	4,62	111,43
29	F13x	PD01	DB08	24,30	24,80	25,00	24,60	4	24,68		0,30	1,21	112,05
30	F24x	PD01	DB99	19,00	40,00	18,00	28,00	0	26,25	b *	10,21	38,90	119,20
31	A47	PC01	DB08	217,70	220,10	211,50	215,30	0	216,15	b *	3,67	1,70	981,50
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* = non tolerable mean because more than +/-

n	Mean	S _r	CV _r
all labs	112	22,02	0,457
15	% from the mean		2,075
28		1,457	6,617

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Mn Sample: 1

Unit: µg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %	
		P	D	1	2	3	4		b * b *	V _i			
1	A51	PD02	DB08	27,50	26,90	27,20	27,00	0	27,15	b *	0,26	0,97	71,33
2	A57	PZ02	DD02	30,60	29,90	29,40	30,50	0	30,10	b *	0,56	1,86	79,09
3	A47	PD01	DB08	34,50	29,70	34,10	30,00	0	32,08	b *	2,58	8,04	84,27
4	F08x	PE99	DB08	32,79	32,59	33,68	33,38	4	33,11		0,51	1,53	86,99
5	F19x	PD02	DB08	34,80	34,80	34,80	34,80	4	34,80		0,00	0,00	91,43
6	A82	PD01	DB08	35,55	35,58	35,58	35,41	4	35,53		0,08	0,23	93,35
7	A45x	PE99	DB08	36,00	36,20	36,00	35,80	4	36,00		0,16	0,45	94,59
8	F15x	PC01	DB08	35,90	35,90	35,90	37,40	4	36,28		0,75	2,07	95,31
9	F05x	PD02	DB08	36,70	36,50	36,50	36,50	4	36,55		0,10	0,27	96,03
10	F16x	PC01	DB08	36,22	36,26	37,12	38,17	4	36,94		0,92	2,48	97,06
11	F33x	PC01	DB10	37,57	37,04	37,77	36,69	4	37,27		0,49	1,32	97,92
12	F07x	PD99	DB08	36,97	38,02	37,85	36,80	4	37,41		0,61	1,64	98,29
13	A60x	PD01	DB10	36,97	36,90	37,69	38,21	4	37,44		0,62	1,67	98,38
14	F27	PD01	DB01	36,57	40,19	38,01	35,93	4	37,68		1,89	5,01	98,99
15	F12x	PC01	DB08	37,00	38,00	38,00	38,00	4	37,75		0,50	1,32	99,19
16	F18x	PD99	DB08	38,00	37,90	38,20	38,10	4	38,05		0,13	0,34	99,97
17	A43x	PB06	DB01	37,50	38,00	38,00	39,00	4	38,13		0,63	1,65	100,17
18	F25	PB06	DB08	37,97	38,71	38,42	38,03	4	38,28		0,35	0,91	100,58
19	F03x	PD02	DB08	37,58	38,43	38,38	38,87	4	38,32		0,54	1,40	100,67
20	A59	PC01	DB08	38,30	38,50	38,30	38,40	4	38,38		0,10	0,25	100,83
21	F02x	PD02	DB08	36,78	39,02	38,72	39,22	4	38,44		1,12	2,92	100,99
22	F14x	PC01	DB08	41,73	37,45	37,45	37,45	4	38,52		2,14	5,56	101,21
23	F06	PD02	DB08	38,90	38,60	39,20	38,60	4	38,83		0,29	0,74	102,01
24	A36	PD02	DB08	39,33	38,59	37,84	39,97	4	38,93		0,92	2,37	102,29
25	F28x	PD02	DB08	38,12	40,48	39,69	37,66	4	38,99		1,32	3,39	102,44
26	F32x	PD01	DB08	38,80	39,00	39,10	39,10	4	39,00		0,14	0,36	102,47
27	F13x	PD01	DB08	39,50	39,20	39,20	39,00	4	39,23		0,21	0,53	103,06
28	A65	PD01	DB08	39,00	42,00	40,00	39,00	4	40,00		1,41	3,54	105,10
29	A58	PD02	DB01	39,09	39,04	41,03	40,86	4	40,01		1,09	2,72	105,11
30	F24x	PD01	DB99	41,00	44,00	42,00	43,00	4	42,50		1,29	3,04	111,67
31	A88	PD01	DB08	43,35	44,63	42,06	43,35	4	43,35		1,05	2,42	113,89
32	A80	PD01	DB10	44,70	45,20	44,60	45,30	0	44,95	b *	0,35	0,78	118,10
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* = non tolerable mean because more than +/-

n Mean S_r CV_r
 all labs 112 38,06 0,691 1,817
 15 % from the mean

I S_R CV_R
 28 2,058 5,408

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Mn Sample: 2

Unit: µg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4			V _i		
1	A59	PC01	DB08	332,90	335,30	337,50	329,70	4	333,85		3,34	94,09
2	A57	PZ02	DD02	328,90	334,60	334,50	337,70	4	333,93		3,66	94,11
3	A82	PD01	DB08	331,10	334,00	335,50	338,50	4	334,78		3,08	94,35
4	F03x	PD02	DB08	346,55	341,27	332,77	323,53	4	336,03		10,08	94,71
5	A45x	PE99	DB08	343,00	339,00	341,00	336,00	4	339,75		2,99	95,75
6	F19x	PD02	DB08	342,00	342,00	342,00	342,00	4	342,00		0,00	96,39
7	F33x	PC01	DB10	358,27	342,31	337,42	333,73	4	342,93		10,81	96,65
8	A47	PD01	DB08	343,00	355,00	333,00	343,00	4	343,50		9,00	96,81
9	A60x	PD01	DB10	358,13	347,48	338,46	331,12	4	343,80		11,66	96,89
10	A43x	PB06	DB01	341,00	357,00	341,00	346,00	4	346,25		7,54	97,59
11	F08x	PE99	DB08	348,66	345,44	342,92	349,93	4	346,74		3,17	97,72
12	F02x	PD02	DB08	348,23	353,55	340,36	400,71 ^a	3	347,38		6,64	97,90
13	F18x	PD99	DB08	348,00	347,00	346,00	350,00	4	347,75		1,71	98,01
14	F07x	PD99	DB08	349,10	351,90	348,80	347,00	4	349,20		2,02	98,42
15	A36	PD02	DB08	353,59	349,32	351,46	345,05	4	349,86		3,65	98,60
16	F14x	PC01	DB08	358,00	363,00	358,00	347,00	4	356,50		6,76	100,47
17	F25	PB06	DB08	355,00	356,30	356,70	358,20	4	356,55		1,32	100,49
18	F16x	PC01	DB08	354,80	360,80	353,80	357,10	4	356,63		3,11	100,51
19	F05x	PD02	DB08	356,00	353,00	358,00	361,00	4	357,00		3,37	100,62
20	F06	PD02	DB08	359,70	358,10	356,40	368,10	4	360,58		5,19	101,62
21	A58	PD02	DB01	360,29	364,49	359,82	358,09	4	360,67		2,72	101,65
22	F15x	PC01	DB08	367,70	361,90	352,20	361,80	4	360,90		6,42	101,72
23	A65	PD01	DB08	366,00	372,00	366,00	345,00	4	362,25		11,84	102,10
24	F27	PD01	DB01	365,60	365,00	360,10	361,60	4	363,08		2,65	102,33
25	F12x	PC01	DB08	371,00	363,00	366,00	367,00	4	366,75		3,30	103,36
26	F13x	PD01	DB08	377,00	377,00	367,00	373,00	4	373,50		4,73	105,27
27	A51	PD02	DB08	372,00	369,00	379,00	377,00	4	374,25		4,57	105,48
28	F32x	PD01	DB08	377,00	375,00	373,00	377,00	4	375,50		1,91	105,83
29	F28x	PD02	DB08	397,50	386,50	375,00	378,70	4	384,43		9,95	108,35
30	A88	PD01	DB08	396,28	405,51	387,05	396,28	4	396,28		7,54	111,69
31	F24x	PD01	DB99	387,00	405,00	406,00	405,00	0	400,75	b	9,18	112,95
32	A80	PD01	DB10	411,00	421,00	433,00	420,00	0	421,25	b *	9,03	118,72
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* = non tolerable mean because more than +/-

n Mean S_r CV_r
 all labs 119 354,81 5,158 1,454

15 % from the mean

I S_R CV_R
 30 15,366 4,331

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Mn Sample: 3

Unit: µg/g

No.	Lab. Code	Method code P	Method code D	Replications				n	Lab.mean		Lab.standard dev.	Recovery
				1	2	3	4		S _i	V _i	%	
1	A43x	PB06	DB01	442,00	458,00	442,00	448,00	4	447,50		7,55	90,22
2	A82	PD01	DB08	441,00	448,80	452,80	453,50	4	449,03		5,74	90,52
3	A60x	PD01	DB10	451,60	455,28	454,17	465,51	4	456,64		6,11	92,06
4	F03x	PD02	DB08	469,36	464,17	461,62	457,40	4	463,14		5,00	93,37
5	A36	PD02	DB08	480,62	472,17	472,17	473,22	4	474,55		4,08	95,67
6	F12x	PC01	DB08	477,00	481,00	492,00	449,00	4	474,75		18,30	95,71
7	A59	PC01	DB08	484,00	484,30	463,40	482,10	4	478,45		10,08	96,46
8	F05x	PD02	DB08	477,00	479,00	477,00	482,00	4	478,75		2,36	96,52
9	F28x	PD02	DB08	464,60	476,30	495,40	484,80	4	480,28		13,05	96,82
10	F16x	PC01	DB08	478,20	491,30	470,30	482,90	4	480,68		8,79	96,90
11	F19x	PD02	DB08	481,00	481,00	481,00	481,00	4	481,00		0,00	96,97
12	A47	PD01	DB08	481,00	476,00	491,00	485,00	4	483,25		6,34	97,42
13	F07x	PD99	DB08	489,90	485,20	483,20	483,30	4	485,40		3,14	97,86
14	F18x	PD99	DB08	492,00	489,00	483,00	488,00	4	488,00		3,74	98,38
15	A45x	PE99	DB08	485,00	489,00	490,00	489,00	4	488,25		2,22	98,43
16	F27	PD01	DB01	490,90	483,50	480,10	505,70	4	490,05		11,37	98,79
17	F14x	PC01	DB08	475,80	491,90	498,30	496,20	4	490,55		10,19	98,89
18	F25	PB06	DB08	494,60	496,20	488,80	494,70	4	493,58		3,27	99,50
19	F33x	PC01	DB10	491,91	513,75	471,24	508,39	4	496,32		19,13	100,06
20	F02x	PD02	DB08	484,92	483,11	497,85	533,53	4	499,85		23,39	100,77
21	F15x	PC01	DB08	504,90	515,50	492,10	487,00	4	499,88		12,85	100,77
22	F08x	PE99	DB08	508,07	502,70	504,23	493,21	4	502,05	c	6,31	101,21
23	A65	PD01	DB08	540,00	501,00	495,00	473,00	0	502,25		27,90	101,25
24	A57	PZ02	DD02	506,40	501,10	499,70	509,20	4	504,10		4,46	101,63
25	A58	PD02	DB01	512,51	508,25	504,28	528,32	4	513,34		10,54	103,49
26	F06	PD02	DB08	520,50	522,80	514,80	524,30	4	520,60		4,17	104,95
27	F13x	PD01	DB08	512,00	528,00	528,00	519,00	4	521,75		7,76	105,18
28	F32x	PD01	DB08	536,00	530,00	529,00	539,00	4	533,50		4,80	107,55
29	A51	PD02	DB08	528,00	550,00	536,00	526,00	4	535,00		10,89	107,86
30	A88	PD01	DB08	543,07	537,53	548,60	543,07	4	543,07		4,52	109,48
31	F24x	PD01	DB99	535,00	544,00	581,00	546,00	4	551,50	*	20,24	111,18
32	A80	PD01	DB10	585,00	576,00	554,00	574,00	4	572,25	*	13,07	115,37
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* = non tolerable mean because more than +/-

n Mean S_r CV_r
all labs 124 496,03 8,499 1,713
15 % from the mean

I S_R CV_R
31 29,224 5,891

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Mn Sample: 4

Unit: µg/g

No.	Lab. Code	Method code P	Method code D	Replications				n	Lab.mean		Lab.standard dev.	Recovery	
				1	2	3	4		s _i	V _i	%		
1	F08x	PE99	DB08	662,97	659,40	672,87	654,56	4	662,45	*	7,75	1,17	82,38
2	A60x	PD01	DB10	739,90	724,55	741,63	747,89	4	738,49		9,91	1,34	91,83
3	A82	PD01	DB08	753,10	757,00	753,10	755,70	4	754,73		1,95	0,26	93,85
4	A43x	PB06	DB01	755,00	755,00	755,00	754,00	4	754,75		0,50	0,07	93,85
5	F03x	PD02	DB08	773,08	764,93	779,30	729,79	4	761,78		22,12	2,90	94,73
6	A45x	PE99	DB08	772,00	769,00	773,00	774,00	4	772,00		2,16	0,28	96,00
7	F16x	PC01	DB08	785,90	781,60	770,40	781,10	4	779,75		6,60	0,85	96,96
8	A57	PZ02	DD02	784,10	779,50	779,90	783,30	4	781,70		2,34	0,30	97,21
9	A58	PD02	DB01	807,94	737,14	802,76	792,37	4	785,05		32,59	4,15	97,62
10	A47	PD01	DB08	780,00	771,00	802,00	791,00	4	786,00		13,44	1,71	97,74
11	F02x	PD02	DB08	797,15	790,16	787,18	771,13	4	786,41		11,01	1,40	97,79
12	F28x	PD02	DB08	812,90	808,20	784,80	750,30	4	789,05		28,61	3,63	98,12
13	F07x	PD99	DB08	791,50	797,60	791,60	791,50	4	793,05		3,03	0,38	98,62
14	F27	PD01	DB01	791,50	797,60	794,10	792,20	4	793,85		2,73	0,34	98,72
15	F14x	PC01	DB08	804,80	795,00	789,90	787,74	4	794,36		7,60	0,96	98,78
16	F18x	PD99	DB08	791,00	791,00	802,00	799,00	4	795,75		5,62	0,71	98,95
17	F06	PD02	DB08	818,40	776,00	800,80	790,80	4	796,50		17,80	2,24	99,05
18	F15x	PC01	DB08	794,60	799,10	795,00	799,90	4	797,15		2,74	0,34	99,13
19	A59	PC01	DB08	805,70	781,30	801,50	806,50	4	798,75		11,84	1,48	99,33
20	A36	PD02	DB08	792,71	796,95	809,67	809,67	4	802,25		8,74	1,09	99,76
21	F33x	PC01	DB10	821,66	805,43	816,51	769,02	4	803,16		23,74	2,96	99,87
22	F25	PB06	DB08	809,00	808,50	814,10	812,10	4	810,93		2,65	0,33	100,84
23	F05x	PD02	DB08	813,00	815,00	815,00	816,00	4	814,75		1,26	0,15	101,32
24	F12x	PC01	DB08	817,00	807,00	825,00	817,00	4	816,50		7,37	0,90	101,53
25	F13x	PD01	DB08	836,00	826,00	822,00	822,00	4	826,50		6,61	0,80	102,78
26	A65	PD01	DB08	840,00	827,00	839,00	827,00	4	833,25		7,23	0,87	103,62
27	F24x	PD01	DB99	766,00	884,00	895,00	886,00	0	857,75	C	61,35	7,15	106,66
28	A51	PD02	DB08	860,00	856,00	872,00	854,00	4	860,50		8,06	0,94	107,01
29	F19x	PD02	DB08	889,00	889,00	889,00	889,00	4	889,00		0,00	0,00	110,55
30	F32x	PD01	DB08	892,00	900,00	906,00	881,00	4	894,75		10,81	1,21	111,26
31	A88	PD01	DB08	912,76	907,22	918,29	912,76	4	912,76		4,52	0,50	113,50
32	A80	PD01	DB10	962,00	935,00	954,00	922,00	4	943,25	*	18,14	1,92	117,30
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* = non tolerable mean because more than +/-

n Mean S_r CV_r
 all labs 124 804,17 9,337 1,161
 15 % from the mean

I S_R CV_R
 31 53,653 6,672

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Fe Sample: 1

Unit: µg/g

No.	Lab. Code	Method code	P	D	Replications				n	Lab.mean		Lab.standard dev.	Recovery
					1	2	3	4		s _i	v _i	%	
1	F32x	PD01	DB08		108,00	111,00	111,00	110,00	4	110,00		1,41	89,51
2	F08x	PE99	DB08		110,13	107,56	120,20	118,21	4	114,03		6,13	92,78
3	A82	PD01	DB08		114,60	116,20	114,70	115,80	4	115,33		0,80	93,84
4	F12x	PC01	DB08		115,00	116,00	118,00	116,00	4	116,25		1,26	94,59
5	F05x	PD02	DB08		115,00	118,00	118,00	115,00	4	116,50		1,73	94,80
6	A59	PC01	DB08		119,19	116,15	116,63	114,84	4	116,70		1,82	94,96
7	F33x	PC01	DB10		119,90	119,29	115,49	112,54	4	116,81		3,45	95,05
8	F19x	PD02	DB08		117,00	117,00	117,00	117,00	4	117,00		0,00	95,20
9	A45x	PE99	DB08		118,00	118,00	119,00	116,00	4	117,75		1,26	95,81
10	F27	PD01	DB01		118,80	122,60	118,20	117,50	4	119,28		2,28	97,06
11	F02x	PD02	DB08		119,14	126,66	113,25	118,40	4	119,36		5,53	97,13
12	F06x	PD02	DB08		120,20	118,70	121,70	118,20	4	119,70		1,58	97,40
13	F28x	PD02	DB08		119,20	124,90	120,40	119,10	4	120,90		2,73	98,38
14	A36	PD02	DB08		123,31	121,19	119,06	124,38	4	121,99		2,36	99,26
15	A47	PD01	DB08		121,00	123,00	123,00	125,00	4	123,00		1,63	100,09
16	F13x	PD01	DB08		124,00	121,00	123,00	124,00	4	123,00		1,41	100,09
17	F25	PB06	DB08		124,80	123,20	121,80	123,20	4	123,25		1,23	100,29
18	F03x	PD02	DB08		121,68	125,16	124,72	124,96	4	124,13		1,64	101,01
19	F07x	PD99	DB08		124,70	126,80	123,90	123,20	4	124,65		1,56	101,43
20	F15x	PC01	DB08		124,60	124,00	126,00	124,60	4	124,80		0,85	101,55
21	F16x	PC01	DB08		127,60	121,80	126,90	125,30	4	125,40		2,59	102,04
22	A60x	PD01	DB10		121,57	121,33	131,30	128,73	4	125,73		5,06	102,31
23	F14x	PC01	DB08		127,20	125,00	126,20	127,00	4	126,35		1,00	102,81
24	A88	PD01	DB08		128,89	122,76	135,03	128,89	4	128,89		5,01	104,88
25	A51	PD02	DB08		127,00	133,00	129,00	130,00	4	129,75		2,50	105,58
26	F18x	PD99	DB08		129,00	132,00	130,00	129,00	4	130,00		1,41	105,78
27	A65	PD01	DB08		131,30	134,80	136,40	144,20	4	136,68		5,45	111,21
28	A57	PZ02	DD02		139,70	136,00	134,60	139,90	4	137,55		2,66	111,93
29	A58	PD02	DB01		142,41	139,21	136,04	138,93	4	139,15		2,60	113,23
30	F24x	PD01	DB99		120,00	180,00	120,00	160,00	0	145,00	b	30,00	20,69
31	A80	PD01	DB10		149,00	151,00	148,00	154,00	0	150,50	b *	2,65	122,46
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* = non tolerable mean because more than +/-

n Mean S_r CV_r
 all labs 116 122,89 2,377 1,934
 20 % from the mean

I S_R CV_R
 29 7,075 5,757

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Fe Sample: 2

Unit: µg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %	
		P	D	1	2	3	4		V _i				
1	A57	PZ02	DD02	245,90	220,90	235,20	246,60	4	237,15	12,02	5,07	87,57	
2	F25	PB06	DB08	234,60	245,76	236,10	235,10	4	237,89	5,28	2,22	87,84	
3	F33x	PC01	DB10	258,03	226,43	257,94	238,66	4	245,27	15,51	6,33	90,56	
4	F06x	PD02	DB08	216,60	258,10	237,40	269,20	4	245,33	23,25	9,48	90,59	
5	F08x	PE99	DB08	242,38	249,97	240,12	252,69	4	246,29	6,00	2,44	90,94	
6	F05x	PD02	DB08	243,00	249,00	248,00	249,00	4	247,25	2,87	1,16	91,30	
7	F27	PD01	DB01	243,50	258,90	249,50	258,70	4	252,65	7,51	2,97	93,29	
8	A59	PC01	DB08	254,16	255,45	257,61	254,82	4	255,51	1,50	0,59	94,35	
9	A82	PD01	DB08	253,50	251,50	253,60	266,40	4	256,25	6,84	2,67	94,62	
10	F18x	PD99	DB08	270,00	246,00	254,00	258,00	4	257,00	10,00	3,89	94,90	
11	F28x	PD02	DB08	262,40	257,60	248,70	268,60	4	259,33	8,39	3,24	95,76	
12	A36	PD02	DB08	245,70	244,63	276,68	278,82	4	261,46	18,84	7,21	96,54	
13	F02x	PD02	DB08	284,61	255,45	217,65	298,76	4	264,12	35,84	13,57	97,53	
14	A45x	PE99	DB08	270,00	261,00	257,00	276,00	4	266,00	8,60	3,23	98,22	
15	F32x	PD01	DB08	279,00	254,00	275,00	259,00	4	266,75	12,12	4,54	98,50	
16	A60x	PD01	DB10	270,77	305,22	228,15	275,42	4	269,89	31,74	11,76	99,66	
17	F13x	PD01	DB08	275,00	265,00	264,00	285,00	4	272,25	9,84	3,62	100,53	
18	F03x	PD02	DB08	278,68	281,90	275,33	262,81	4	274,68	8,36	3,04	101,43	
19	F07x	PD99	DB08	284,00	281,50	271,10	281,00	4	279,40	5,69	2,04	103,17	
20	F14x	PC01	DB08	271,20	281,10	286,00	294,00	4	283,08	9,54	3,37	104,53	
21	F15x	PC01	DB08	355,60	276,10	242,30	261,40	0	283,85	49,79	17,54	104,81	
22	A65	PD01	DB08	270,30	305,50	307,40	253,00	4	284,05	26,82	9,44	104,89	
23	A51	PD02	DB08	263,00	281,00	313,00	281,00	4	284,50	20,81	7,31	105,05	
24	F12x	PC01	DB08	289,00	281,00	285,00	284,00	4	284,75	3,30	1,16	105,14	
25	F16x	PC01	DB08	285,90	287,60	284,20	285,90	4	285,90	1,39	0,49	105,57	
26	F24x	PD01	DB99	250,00	300,00	310,00	290,00	4	287,50	26,30	9,15	106,16	
27	F19x	PD02	DB08	295,00	295,00	295,00	295,00	4	295,00	0,00	0,00	108,93	
28	A47	PD01	DB08	285,00	302,00	304,00	291,00	4	295,50	9,04	3,06	109,11	
29	A88	PD01	DB08	299,90	271,39	328,41	299,90	4	299,90	23,28	7,76	110,74	
30	A58	PD02	DB01	306,46	308,47	303,45	301,49	4	304,97	3,10	1,02	112,61	
31	A80	PD01	DB10	274,00	332,00	325,00	369,00	4	325,00	*	39,10	12,03	120,01
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* = non tolerable mean because more than +/-

n Mean S_r CV_r
 all labs 120 270,82 13,096 4,836

20 % from the mean

I S_R CV_R
 30 21,492 7,936

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Fe Sample: 3

Unit: µg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %	
		P	D	1	2	3	4		s_i	V_i			
1	A47	PD01	DB08	36,00	37,00	34,00	34,00	4	35,25		1,50	4,26	83,62
2	F08x	PE99	DB08	35,23	35,29	37,42	34,41	4	35,59		1,29	3,61	84,42
3	A36	PD02	DB08	38,55	36,44	35,07	36,13	4	36,55		1,46	3,99	86,70
4	A59	PC01	DB08	37,61	34,46	34,72	43,53	4	37,58		4,22	11,22	89,15
5	F27	PD01	DB01	35,62	43,02	34,82	39,52	4	38,25		3,79	9,90	90,73
6	F14x	PC01	DB08	39,40	38,90	37,10	38,90	4	38,58		1,01	2,62	91,51
7	F05x	PD02	DB08	38,60	37,30	40,20	38,30	4	38,60		1,20	3,12	91,57
8	F06x	PD02	DB08	38,60	39,20	36,50	43,00	4	39,33		2,71	6,89	93,29
9	A60x	PD01	DB10	38,18	38,78	38,16	42,50	4	39,41		2,08	5,28	93,48
10	F19x	PD02	DB08	39,90	39,90	39,90	39,90	4	39,90		0,00	0,00	94,65
11	F18x	PD99	DB08	40,20	41,10	39,20	40,20	4	40,18		0,78	1,93	95,31
12	F12x	PC01	DB08	39,00	41,00	42,00	41,00	4	40,75		1,26	3,09	96,67
13	F24x	PD01	DB99	44,00	41,00	39,00	39,00	4	40,75		2,36	5,80	96,67
14	F13x	PD01	DB08	38,80	40,90	40,70	43,00	4	40,85		1,72	4,20	96,91
15	A80	PD01	DB10	41,80	41,30	40,70	42,60	4	41,60		0,80	1,93	98,69
16	A45x	PE99	DB08	42,10	40,40	47,20	37,60	4	41,83		4,04	9,65	99,22
17	F07x	PD99	DB08	41,94	40,82	41,52	44,17	4	42,11		1,45	3,44	99,90
18	A82	PD01	DB08	55,29a	42,66	43,84	41,29	3	42,60		1,28	3,00	101,05
19	F25	PB06	DB08	43,59	43,76	42,77	42,12	4	43,06		0,76	1,77	102,15
20	F33x	PC01	DB10	40,13	44,05	46,59	42,27	4	43,26		2,74	6,33	102,62
21	F03x	PD02	DB08	42,54	43,61	44,70	44,46	4	43,83		0,98	2,23	103,97
22	A88	PD01	DB08	44,09	47,23	40,94	44,09	4	44,09		2,57	5,82	104,59
23	F32x	PD01	DB08	33,80	53,10	51,70	39,20	4	44,45		9,46	21,28	105,45
24	A65	PD01	DB08	43,50	53,10	39,40	44,10	4	45,03		5,77	12,82	106,81
25	A58	PD02	DB01	48,08	48,27	47,57	50,63	4	48,64		1,36	2,80	115,38
26	F02x	PD02	DB08	39,70	41,53	63,75	58,17	4	50,79	*	11,99	23,60	120,48
27	F28x	PD02	DB08	52,10	51,40	53,10	56,10	4	53,18	*	2,07	3,89	126,15
28	F16x	PC01	DB08	53,09	56,70	51,20	56,73	4	54,43	*	2,75	5,05	129,12
29	A57	PZ02	DD02	56,70	60,40	56,40	60,60	0	58,53	b*	2,29	3,90	138,84
30	F15x	PC01	DB08	41,70	88,30	101,70	68,40	0	75,03	b*	26,09	34,78	177,98
31													
32													
33	A51	PD02	DB08	<60	<60	<60	<60			**			
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* = non tolerable mean because more than +/-

** = higher than maximum acceptable LOQ

n Mean
all labs 111 42,15
20 % from the mean

I S_R CV_R
28 4,813 11,417

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Fe Sample: 4

Unit: µg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		b	V _i		
1	F08x	PE99	DB08	88,52	87,69	89,65	93,46	0	89,83	b	2,55	81,65
2	A82	PD01	DB08	98,93	99,23	98,90	98,84	4	98,98		0,17	89,96
3	F32x	PD01	DB08	99,00	100,00	102,00	101,00	4	100,50		1,29	91,35
4	A45x	PE99	DB08	102,00	104,00	104,00	105,00	4	103,75		1,26	94,30
5	F27	PD01	DB01	101,30	104,70	104,20	107,80	4	104,50		2,66	94,98
6	F25	PB06	DB08	104,60	106,90	103,28	105,50	4	105,07		1,52	95,50
7	A59	PC01	DB08	106,29	104,46	104,72	105,95	4	105,36		0,90	95,76
8	F19x	PD02	DB08	106,00	106,00	106,00	106,00	4	106,00		0,00	96,35
9	F33x	PC01	DB10	110,46	108,00	105,71	102,39	4	106,64		3,43	96,93
10	F12x	PC01	DB08	108,00	107,00	108,00	106,00	4	107,25		0,96	97,48
11	F24x	PD01	DB99	90,00	110,00	120,00	110,00	0	107,50	c	12,58	11,71
12	F06x	PD02	DB08	110,10	104,50	108,90	108,00	4	107,88		2,41	98,05
13	A60x	PD01	DB10	105,62	105,77	112,08	109,03	4	108,13		3,07	98,28
14	F16x	PC01	DB08	106,90	107,90	108,70	110,00	4	108,38		1,31	98,50
15	F05x	PD02	DB08	107,00	109,00	109,00	109,00	4	108,50		1,00	98,62
16	F03x	PD02	DB08	108,94	106,28	110,26	108,56	4	108,51		1,66	98,63
17	F02x	PD02	DB08	111,14	110,43	108,04	105,84	4	108,86		2,41	98,95
18	F28x	PD02	DB08	108,80	110,10	109,50	107,60	4	109,00		1,07	99,07
19	A36	PD02	DB08	108,10	107,04	109,16	112,34	4	109,16		2,29	99,22
20	A47	PD01	DB08	107,00	111,00	109,00	111,00	4	109,50		1,91	99,53
21	F07x	PD99	DB08	110,30	113,20	111,60	111,70	4	111,70		1,19	101,53
22	A58	PD02	DB01	110,33	113,26	112,22	113,01	4	112,21		1,33	101,99
23	F14x	PC01	DB08	114,00	115,00	113,00	113,00	4	113,75		0,96	103,39
24	F13x	PD01	DB08	116,00	114,00	113,00	114,00	4	114,25		1,26	103,84
25	F18x	PD99	DB08	115,00	114,00	117,00	114,00	4	115,00		1,41	104,53
26	F15x	PC01	DB08	112,90	113,80	115,20	122,40	4	116,08		4,32	105,50
27	A57	PZ02	DD02	118,90	118,50	119,50	120,90	4	119,45		1,05	108,57
28	A51	PD02	DB08	119,00	120,00	120,00	119,00	4	119,50		0,58	108,62
29	A88	PD01	DB08	119,83	122,34	117,32	119,83	4	119,83		2,05	108,92
30	A65	PD01	DB08	119,90	122,60	120,70	128,20	4	122,85		3,74	111,66
31	A80	PD01	DB10	137,00	136,00	139,00	135,00	0	136,75	b *	1,71	124,30
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* = non tolerable mean because more than +/-

all labs	n	Mean	s_r	CV_r
20	112	110,02	1,686	1,533
	% from the mean			

I	s_r	CV_r
28	5,848	5,315

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Cu Sample: 1

Unit: µg/g

No.	Lab. Code	Method code	Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
			P	D	1	2	3	4	\bar{x}	s_i	
1	F05	PD02	DB08		6,90	6,96	6,96	6,90	6,93	b *	0,03
2	F08x	PE99	DB08		9,03	9,08	9,06	8,95	9,03	*	0,06
3	F28x	PD02	DB08		9,99	10,25	9,65	10,38	10,07		0,32
4	F27	PD01	DB01		11,00	10,91	9,28	9,72	10,23		0,86
5	F12x	PC01	DB10		10,10	10,40	10,40	10,50	10,35		0,17
6	F14x	PC01	DB10		10,67	10,16	10,64	10,44	10,48		0,24
7	A47	PD01	DB08		11,02	10,55	10,50	10,26	10,58		0,32
8	F19x	PD02	DB08		10,70	10,70	10,70	10,70	10,70		0,00
9	F32x	PD01	DB08		10,81	10,81	10,71	10,54	10,72		0,13
10	F07x	PD99	DB08		10,91	11,00	11,02	11,03	10,99		0,05
11	A60x	PD01	DB10		10,85	10,83	11,12	11,35	11,04		0,25
12	A45x	PE99	DB08		11,50	11,00	11,50	10,80	11,20		0,36
13	F15x	PC01	DB09		11,40	11,40	11,00	11,00	11,20		0,23
14	F13x	PD01	DB10		11,10	11,20	11,30	11,40	11,25		0,13
15	F02x	PD02	DB08		11,16	11,65	10,97	11,26	11,26		0,29
16	A59	PC01	DB08		11,58	11,54	11,13	11,27	11,38		0,22
17	A82	PD01	DB10		11,52	11,55	11,62	11,38	11,52		0,10
18	F18x	PD99	DB10		11,70	11,60	11,60	11,60	11,63		0,05
19	A57	PZ02	DD02		11,60	11,50	11,60	12,00	11,68		0,22
20	A36	PD02	DB08		12,01	11,48	11,48	11,91	11,72		0,28
21	F24x	PD01	DB99		10,59	14,32	7,44	14,70	11,76	c	3,43
22	F25	PB06	DB08		11,80	11,82	11,91	11,69	11,81		0,09
23	F33	PD01	DB10		11,10	11,66	11,82	12,73	11,83		0,68
24	F06x	PD02	DB08		12,00	11,80	12,20	12,20	12,05		0,19
25	A65	PD01	DB08		11,90	12,60	11,80	12,10	12,10		0,36
26	F03x	PD02	DB08		12,41	12,50	12,72	12,82	12,61		0,19
27	A80	PD01	DB10		12,60	12,90	12,60	12,60	12,68		0,15
28	F16x	PD01	DB08		12,84	12,47	13,00	12,59	12,73		0,24
29	A88	PD01	DB08		13,10	12,31	13,38	12,93	12,93		0,45
30	A51	PD02	DB08		13,00	13,80	13,70	13,50	13,50		0,36
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* = non tolerable mean because more than +/-

n Mean s_r CV_r
 all labs 112 11,40 0,249 2,183
 20 % from the mean

I s_R CV_R
 28 0,979 8,587

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Cu Sample: 2

Unit: µg/g

No.	Lab. Code	Method code P	Method code D	Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %	
				1	2	3	4			V_i			
1	F08x	PE99	DB08	3,87	4,44	4,60	4,73	0	4,41	b *	0,38	8,63	56,37
2	F07x	PD99	DB08	7,15	7,10	7,07	7,07	4	7,10		0,04	0,54	90,72
3	F28x	PD02	DB08	6,89	7,35	6,93	7,28	4	7,11		0,23	3,30	90,91
4	F12x	PC01	DB10	7,28	7,06	7,15	7,13	4	7,16		0,09	1,28	91,47
5	A57	PZ02	DD02	7,10	7,20	7,00	7,50	4	7,20		0,22	3,00	92,05
6	A45x	PE99	DB08	7,34	7,33	7,21	7,35	4	7,31		0,07	0,90	93,42
7	A60x	PD01	DB10	7,41	7,46	7,35	7,20	4	7,35		0,11	1,56	94,03
8	F14x	PC01	DB10	7,47	7,28	7,29	7,49	4	7,38		0,11	1,53	94,38
9	F27	PD01	DB01	7,40	7,66	6,41	8,13	4	7,40		0,73	9,81	94,58
10	F13x	PD01	DB10	7,41	7,23	7,21	7,84	4	7,42		0,29	3,94	94,89
11	A47	PD01	DB08	7,55	7,77	7,22	7,39	4	7,48		0,23	3,13	95,66
12	A82	PD01	DB10	7,51	7,39	7,55	7,50	4	7,49		0,07	0,96	95,70
13	F32x	PD01	DB08	7,44	7,53	7,56	7,55	4	7,52		0,05	0,73	96,14
14	F05	PD02	DB08	7,82	7,65	7,42	7,51	4	7,60		0,17	2,30	97,16
15	A59	PC01	DB08	7,61	7,30	8,72	6,96	4	7,65		0,76	9,97	97,77
16	F33	PD01	DB10	7,98	8,31	7,36	7,33	4	7,75		0,48	6,21	99,02
17	A36	PD02	DB08	7,73	7,78	7,86	7,77	4	7,79		0,05	0,70	99,53
18	F18x	PD99	DB10	7,90	7,78	7,68	7,90	4	7,82		0,11	1,36	99,91
19	F19x	PD02	DB08	7,85	7,85	7,85	7,85	4	7,85		0,00	0,00	100,36
20	F06x	PD02	DB08	8,25	7,86	8,08	8,26	4	8,11		0,19	2,31	103,71
21	F02x	PD02	DB08	7,71	8,28	7,45	9,08	4	8,13		0,72	8,88	103,94
22	F25	PB06	DB08	8,00	8,24	8,05	8,33	4	8,16		0,16	1,91	104,26
23	A80	PD01	DB10	8,07	8,06	8,36	8,58	4	8,27		0,25	3,03	105,70
24	A65	PD01	DB08	8,40	8,50	8,10	8,20	4	8,30		0,18	2,20	106,11
25	F03x	PD02	DB08	8,62	8,26	8,87	8,44	4	8,55		0,26	3,05	109,27
26	F15x	PC01	DB09	8,10	8,50	8,80	9,00	4	8,60		0,39	4,55	109,95
27	F16x	PD01	DB08	8,58	8,88	8,47	8,62	4	8,64		0,17	2,01	110,40
28	A88	PD01	DB08	8,76	8,58	8,95	8,76	4	8,76		0,15	1,72	112,02
29	A51	PD02	DB08	8,88	9,58	9,25	8,88	4	9,15		0,34	3,68	116,95
30	F24x	PD01	DB99	10,04	10,06	6,35	10,44	0	9,22	b	1,92	20,86	117,90
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n Mean s_r CV_r
all labs 112 7,82 0,237 3,034

* = non tolerable mean because more than +/-

20 % from the mean

I s_R CV_R
28 0,559 7,147

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Cu Sample: 3

Unit: µg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev.	Recovery
		P	D	1	2	3	4		s _i	V _i	%	
1	A88	PD01	DB08	2,78	2,82	2,74	2,78	4	2,78		0,03	81,53
2	F28x	PD02	DB08	2,91	2,85	3,07	2,92	4	2,94		0,09	86,09
3	F12x	PC01	DB10	3,06	3,02	3,06	2,86	4	3,00		0,10	87,98
4	F08x	PE99	DB08	3,04	3,00	3,03	2,95	4	3,01		0,04	88,19
5	F13x	PD01	DB10	3,12	3,33	3,31	3,35	4	3,28		0,11	96,12
6	F14x	PC01	DB10	3,30	3,23	3,30	3,32	4	3,29		0,04	96,41
7	A45x	PE99	DB08	3,39	3,27	3,24	3,28	4	3,30		0,07	96,63
8	A47	PD01	DB08	3,44	3,30	3,30	3,16	4	3,30		0,11	96,78
9	A82	PD01	DB10	3,32	3,41	3,19	3,29	4	3,30		0,09	96,80
10	A59	PC01	DB08	3,42	3,41	3,34	3,07	4	3,31		0,16	97,07
11	F07x	PD99	DB08	3,34	3,32	3,30	3,32	4	3,32		0,02	97,37
12	F32x	PD01	DB08	3,39	3,37	3,37	3,42	4	3,39		0,02	99,35
13	A36	PD02	DB08	3,40	3,33	3,46	3,42	4	3,40		0,05	99,79
14	F19x	PD02	DB08	3,41	3,41	3,41	3,41	4	3,41		0,00	100,01
15	A60x	PD01	DB10	3,53	3,41	3,50	3,42	4	3,47		0,06	101,65
16	F06x	PD02	DB08	3,45	3,40	3,61	3,44	4	3,48		0,09	101,91
17	F05	PD02	DB08	3,47	3,48	3,48	3,49	4	3,48		0,01	102,06
18	A57	PZ02	DD02	3,30	3,50	3,70	3,50	4	3,50		0,16	102,65
19	F15x	PC01	DB09	3,00	3,90	3,80	3,80	0	3,63	c	0,42	106,31
20	F18x	PD99	DB10	3,64	3,72	3,59	3,72	4	3,67		0,06	107,56
21	F02x	PD02	DB08	3,48	3,63	3,72	3,86	4	3,67		0,16	107,70
22	F03x	PD02	DB08	3,70	3,76	3,53	3,71	4	3,68		0,10	107,78
23	F16x	PD01	DB08	3,76	3,71	3,55	3,74	4	3,69		0,09	108,22
24	F33	PD01	DB10	3,67	3,74	3,55	3,82	4	3,70		0,11	108,36
25	F25	PB06	DB08	3,76	3,75	3,77	3,66	4	3,74		0,05	109,54
26	A65	PD01	DB08	3,70	3,70	3,70	4,00	4	3,78		0,15	110,71
27	A80	PD01	DB10	3,78	3,83	3,82	3,81	4	3,81		0,02	111,74
28	A51	PD02	DB08	4,24	4,45	4,30	4,29	0	4,32	b *	0,09	126,69
29	F24x	PD01	DB99	4,99	4,50	4,08	4,52	0	4,52	b *	0,37	8,22
30	F27	PD01	DB01	4,65	5,33	5,23	5,53	0	5,18	b *	0,38	132,63
31												151,98
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* = non tolerable mean because more than +/-

n Mean S_r CV_r
 all labs 104 3,41 0,078 2,278
 20 % from the mean

I S_R CV_R
 26 0,270 7,925

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Cu Sample: 4

Unit: µg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %		
		P	D	1	2	3	4		b	*	V _i			
1	F08x	PE99	DB08	2,74	2,70	2,77	2,55	0	2,69	b	*	0,10	3,62	45,14
2	F24x	PD01	DB99	4,20	2,82	7,15	4,72	0	4,72	b	*	1,81	38,24	79,32
3	F12x	PC01	DB10	5,56	5,44	5,49	5,51	4	5,50			0,05	0,90	92,38
4	A45x	PE99	DB08	5,96	5,42	5,51	5,40	4	5,57			0,26	4,71	93,60
5	F13x	PD01	DB10	5,30	5,65	5,64	5,76	4	5,59			0,20	3,57	93,85
6	A47	PD01	DB08	5,68	5,44	5,62	5,66	4	5,60			0,11	1,96	94,06
7	F14x	PC01	DB10	5,66	5,62	5,53	5,67	4	5,62			0,06	1,13	94,40
8	A82	PD01	DB10	5,66	5,64	5,64	5,60	4	5,63			0,02	0,38	94,62
9	F07x	PD99	DB08	5,68	5,64	5,63	5,62	4	5,64			0,02	0,42	94,75
10	F32x	PD01	DB08	5,78	5,73	5,77	5,57	4	5,71			0,10	1,71	95,95
11	A60x	PD01	DB10	5,68	5,57	5,89	5,73	4	5,72			0,13	2,26	96,04
12	F05	PD02	DB08	5,66	5,71	5,72	5,82	4	5,73			0,07	1,17	96,20
13	F19x	PD02	DB08	5,73	5,73	5,73	5,73	4	5,73			0,00	0,00	96,25
14	A57	PZ02	DD02	5,70	5,80	5,70	5,80	4	5,75			0,06	1,00	96,58
15	A88	PD01	DB08	5,77	6,07	5,47	5,77	4	5,77			0,24	4,25	96,92
16	F28x	PD02	DB08	5,93	5,53	5,84	5,79	4	5,77			0,17	3,01	96,98
17	F02x	PD02	DB08	6,02	5,93	5,85	5,87	4	5,92			0,08	1,29	99,39
18	A59	PC01	DB08	5,90	5,92	6,01	5,86	4	5,92			0,06	1,07	99,48
19	F15x	PC01	DB09	6,10	6,10	6,10	5,50	4	5,95			0,30	5,04	99,94
20	F06x	PD02	DB08	6,15	5,75	5,99	5,97	4	5,97			0,16	2,76	100,19
21	A36	PD02	DB08	6,03	5,92	6,04	6,07	4	6,02			0,07	1,09	101,03
22	F16x	PD01	DB08	6,19	6,20	6,21	6,25	4	6,21			0,03	0,46	104,36
23	F18x	PD99	DB10	6,16	6,28	6,27	6,30	4	6,25			0,06	1,01	105,02
24	F33	PD01	DB10	6,47	6,28	6,13	6,14	4	6,26			0,16	2,54	105,06
25	A65	PD01	DB08	6,50	6,30	6,20	6,30	4	6,33			0,13	1,99	106,24
26	F03x	PD02	DB08	6,54	6,55	6,36	6,11	4	6,39			0,21	3,22	107,33
27	A80	PD01	DB10	6,56	6,51	6,54	6,43	4	6,51			0,06	0,88	109,35
28	F25	PB06	DB08	6,53	6,58	6,58	6,54	4	6,56			0,03	0,40	110,14
29	F27	PD01	DB01	10,48	6,76	5,93	4,58	0	6,94	c		2,53	36,42	116,51
30	A51	PD02	DB08	7,19	6,91	7,06	7,39	4	7,14			0,20	2,85	119,89
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* = non tolerable mean because more than +/-

n Mean s_r CV_r
 all labs 108 5,95 0,113 1,891
 20 % from the mean

I s_R CV_R
 27 0,387 6,507

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Pb Sample: 1

Unit: µg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		s_i	V_i		
1	F33	PD01	DB10	0,20	0,21	0,23	0,24	4	0,22		0,02	73,56
2	F12x	PC01	DB10	0,26	0,27	0,26	0,26	4	0,26		0,01	87,91
3	A36	PD02	DB10	0,27	0,28	0,28	0,26	4	0,27		0,01	91,16
4	F13x	PD01	DB10	0,30	0,31	0,27	0,28	4	0,29		0,02	96,41
5	A82	PD01	DB10	0,29	0,29	0,29	0,29	4	0,29		0,00	96,76
6	F08x	PD01	DB10	0,29	0,28	0,29	0,30	4	0,29		0,01	96,91
7	A47	PD01	DB10	0,28	0,28	0,28	0,34	4	0,30		0,03	98,42
8	A60x	PD01	DB10	0,29	0,28	0,31	0,31	4	0,30		0,02	98,80
9	A80	PD01	DB10	0,29	0,32	0,30	0,30	4	0,30		0,01	100,50
10	F16x	PC01	DB10	0,27	0,36	0,25	0,34	4	0,30		0,05	101,42
11	F14x	PC01	DB10	0,33	0,33	0,31	0,32	4	0,32		0,01	106,84
12	F18x	PD99	DB10	0,32	0,37	0,33	0,34	4	0,34		0,02	113,01
13	F32x	PD01	DB10	0,35	0,34	0,35	0,33	4	0,34		0,01	114,60
14	F07x	PD99	DB08	0,42	0,34	0,35	0,37	4	0,37		0,04	123,70
15	F27	PD01	DB05	0,54	0,55	0,786a	0,55	0	0,55	b *	0,01	183,38
16	F24	PD01	DB99	0,75	0,89	1,44	1,03	0	1,03	b *	0,30	28,98
17												
18												
19	F19x	PD02	DB08	<1,07	<1,07	<1,07	<1,07			**		
20	F25	PB99	DB08	<,5	<,5	<,5	<,5					
21	F06x	PD02	DB08	<,5	<,5	<,5	<,5					
22	F15x	PC01	DB09	<,5	<,5	<,5	<,5					
23	F05	PD02	DB05	<,125	<,125	<,125	<,125					
24	F02	PD02	DB05	0,54	<,5	0,52	0,53			*		
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n Mean s_r CV_r
 all labs 56 0,30 0,018 5,975

* = non tolerable mean because more than +/-

40 % from the mean

** = higher than maximum acceptable LOQ

Limit for the lower concentration range

| s_R CV_R
 14 0,037 12,258

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Pb Sample: 2

Unit: µg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		Lab.mean	V_i		
1	F33	PD01	DB10	0,54	0,54	0,51	0,51	4	0,53		0,02	75,05
2	A36	PD02	DB10	0,59	0,61	0,59	0,59	4	0,59		0,01	84,68
3	F16x	PC01	DB10	0,60	0,61	0,60	0,58	4	0,60		0,01	85,36
4	A60x	PD01	DB10	0,63	0,65	0,59	0,59	4	0,62		0,03	87,74
5	F12x	PC01	DB10	0,63	0,61	0,61	0,62	4	0,62		0,01	87,78
6	F05	PD02	DB05	0,63	0,64	0,59	0,63	4	0,62		0,02	88,56
7	F13x	PD01	DB10	0,65	0,62	0,70	0,61	4	0,65		0,04	91,98
8	A47	PD01	DB10	0,70	0,71	0,61	0,58	4	0,65		0,06	92,66
9	F18x	PD99	DB10	0,69	0,62	0,64	0,69	4	0,66		0,04	93,94
10	F08x	PD01	DB10	0,65	0,64	0,65	0,69	4	0,66		0,02	93,94
11	F14x	PC01	DB10	0,67	0,68	0,68	0,67	4	0,67		0,01	95,94
12	A80	PD01	DB10	0,61	0,65	0,83	0,71	4	0,70		0,09	99,50
13	A82	PD01	DB10	0,75	0,74	0,73	0,72	4	0,73		0,01	104,36
14	F32x	PD01	DB10	0,76	0,72	0,72	0,75	4	0,74		0,02	105,02
15	F07x	PD99	DB08	0,75	0,74	0,71	0,80	4	0,75		0,03	107,03
16	F06x	PD02	DB08	0,77	0,79	0,63	0,84	4	0,76		0,09	107,98
17	F15x	PC01	DB09	0,80	0,80	0,80	0,70	4	0,78		0,05	110,48
18	F25	PB99	DB08	0,82	0,81	0,77	0,82	4	0,81		0,02	114,75
19	F27	PD01	DB05	1,09	0,92	0,91	0,96	4	0,97	*	0,08	138,49
20	F02	PD02	DB05	1,05	1,00	1,03	1,22a	3	1,03	*	0,03	146,35
21	F24	PD01	DB99	1,36	1,33	1,75	1,48	0	1,48	b *	0,19	12,93
22												
23												
24	F19x	PD02	DB08	<1,11	<1,11	<1,11	<1,11			**		
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n Mean S_r CV_r
 all labs 79 0,70 0,035 5,005

* = non tolerable mean because more than +/-

** = higher than maximum acceptable LOQ

30 % from the mean

I S_R CV_R
 20 0,123 17,399

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Pb Sample: 3

Unit: µg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %	
		P	D	1	2	3	4		s_i	V_i			
1	F32x	PD01	DB10	0,05	0,05	0,04	0,04	4	0,04		0,00	6,49	78,82
2	A47	PD01	DB10	0,05	0,05	0,04	0,05	4	0,05		0,00	7,53	84,58
3	A36	PD02	DB10	0,05	0,05	0,05	0,05	4	0,05		0,00	4,62	91,22
4	F13x	PD01	DB10	0,05	0,05	0,06	0,05	4	0,05		0,00	6,19	91,66
5	F08x	PD01	DB10	0,05	0,05	0,05	0,06	4	0,05		0,00	7,08	94,76
6	A80	PD01	DB10	0,05	0,05	0,05	0,06	4	0,05		0,00	3,10	95,83
7	F18x	PD99	DB10	0,06	0,06	0,06	0,05	4	0,06		0,00	7,41	103,44
8	F16x	PC01	DB10	0,06	0,06	0,06	0,06	4	0,06		0,00	2,76	103,93
9	A82	PD01	DB10	0,06	0,06	0,06	0,06	4	0,06		0,00	3,12	104,24
10	F12x	PC01	DB10	0,06	0,09	0,06	0,07	4	0,07		0,01	16,53	124,43
11	F33	PD01	DB10	0,07	0,07	0,07	0,07	4	0,07		0,00	4,46	127,09
12	A60x	PD01	DB10	0,10	0,21	0,06	0,8542 α	0	0,12	b *	0,08	65,35	219,70
13	F24	PD01	DB99	0,22	0,51	0,38	0,37	0	0,37	b *	0,12	32,05	655,37
14	F27	PD01	DB05	0,49	0,36	0,49	0,41	0	0,44	b *	0,06	14,41	776,26
15													
16													
17	F19x	PD02	DB08	<1,07	<1,07	<1,07	<1,07				**		
18	F25	PB99	DB08	<,5	<,5	<,5	<,5						
19	F06x	PD02	DB08	<,5	<,5	<,5	<,5						
20	F02	PD02	DB05	<,5	<,5	<,5	<,5						
21	F15x	PC01	DB09	<,5	<,5	<,5	<,5						
22	F07x	PD99	DB08	<,23	<,23	<,23	<,23						
23	F05	PD02	DB05	<,125	<,125	<,125	<,125						
24	F14x	PC01	DB10	<,1	<,1	<,1	<,1						
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n Mean s_r CV_r
 all labs 44 0,06 0,004 6,461

40 % from the mean

* = non tolerable mean because more than +/-

** = higher than maximum acceptable LOQ

Lower than the lowest evaluated result

| s_r CV_r
 11 0,008 15,012

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Pb Sample: 4

Unit: µg/g

No.	Lab. Code	Method code	P	D	Replications				n	Lab.mean		Lab.standard dev.	Recovery %
					1	2	3	4		s _i	V _i		
1	F16x	PC01	DB10		0,18	0,19	0,18	0,19	4	0,18		0,01	2,98 85,78
2	F13x	PD01	DB10		0,19	0,19	0,20	0,19	4	0,19		0,00	2,12 89,05
3	A36	PD02	DB10		0,20	0,20	0,19	0,19	4	0,19		0,01	3,36 90,22
4	F33	PD01	DB10		0,20	0,21	0,20	0,21	4	0,20		0,00	2,47 94,31
5	F12x	PC01	DB10		0,20	0,20	0,23	0,20	4	0,21		0,01	6,11 96,41
6	A60x	PD01	DB10		0,21	0,20	0,20	0,22	4	0,21		0,01	3,90 98,26
7	F32x	PD01	DB10		0,21	0,21	0,21	0,22	4	0,21		0,00	1,18 99,33
8	A47	PD01	DB10		0,22	0,22	0,20	0,22	4	0,22		0,01	4,65 100,50
9	A82	PD01	DB10		0,22	0,22	0,22	0,22	4	0,22		0,00	0,16 102,52
10	F18x	PD99	DB10		0,23	0,22	0,24	0,23	4	0,23		0,01	3,44 105,99
11	F14x	PC01	DB10		0,22	0,22	0,24	0,23	4	0,23		0,01	4,09 106,46
12	A80	PD01	DB10		0,23	0,24	0,23	0,23	4	0,23		0,01	2,42 107,98
13	F08x	PD01	DB10		0,24	0,24	0,22	0,24	4	0,23		0,01	3,06 109,73
14	F05	PD02	DB05		0,24	0,24	0,24	0,25	4	0,24		0,01	2,90 113,47
15	F07x	PD99	DB08		0,38	0,39	0,36	0,40	0	0,38	b *	0,01	3,64 178,21
16	F27	PD01	DB05		0,40	0,42	0,28	0,50	0	0,40	b *	0,09	22,73 186,86
17	F25	PB99	DB08		0,61	0,59	0,56	0,67	0	0,61	b *	0,05	7,65 283,97
18	F24	PD01	DB99		0,45	1,28	0,86	0,86	0	0,86	b *	0,34	39,29 403,17
19													
20													
21	F19x	PD02	DB08		<1,07	<1,07	<1,07	<1,07				**	
22	F06x	PD02	DB08		<,5	<,5	<,5	<,5					
23	F02	PD02	DB05		<,5	<,5	<,5	<,5					
24	F15x	PC01	DB09		<,5	<,5	<,5	<,5					
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n Mean S_r CV_r
 all labs 56 0,21 0,007 3,059

40 % from the mean

* = non tolerable mean because more than +/-

** = higher than maximum acceptable LOQ

Limit for the lower concentration range

| S_R CV_R
 14 0,018 8,278

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Cd Sample: 1

Unit: ng/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		s_i	V_i		
1	F12x	PC01	DB10	3,60	4,50	3,70	4,20	4	4,00		0,42	78,83
2	A82	PD01	DB10	3,77	3,67	4,65	4,71	4	4,20		0,56	82,73
3	F18x	PD99	DB10	4,00	4,80	4,70	4,00	4	4,38		0,43	86,22
4	F33	PD01	DB10	4,26	4,25	4,85	4,54	4	4,48		0,28	88,19
5	F13x	PD01	DB10	4,30	5,10	4,20	4,80	4	4,60		0,42	90,66
6	A36	PD02	DB10	5,00	4,89	5,00	4,78	4	4,92		0,11	96,91
7	A80	PD01	DB10	5,46	5,64	6,04	5,24	4	5,60		0,34	110,27
8	A60x	PD01	DB10	4,52	6,54	5,84	6,03	4	5,73		0,86	112,93
9	F16x	PC01	DB10	6,57	6,87	5,48	5,99	4	6,23		0,62	122,69
10	A47	PD01	DB10	7,10	5,40	8,20	5,80	4	6,63	*	1,28	130,57
11	F27	PD01	DB05	15,45	13,26	12,59	14,82	0	14,03	b *	1,33	276,50
12	F07x	PD99	DB08	24,92	23,75	21,21	24,53	0	23,60	b *	1,67	465,16
13												
14												
15	F19x	PD02	DB08	<80	<80	<80	<80			**		
16	F03x	PD02	DB08	<50	<50	<50	<50					
17	F02	PD02	DB05	<50	<50	<50	<50					
18	F32x	PD01	DB10	<50	<50	<50	<50					
19	F15x	PC01	DB09	<50	<50	<50	<50					
20	F25	PZ99	DB08	<50	<50	<50	<50					
21	F06x	PD02	DB08	<40	<40	<40	<40					
22	F05	PD02	DB05	<25	<25	<25	<25					
23	A45	PE99	DB10	<10	<10	<10	<10					
24	F14x	PC01	DB10	<10	<10	<10	<10					
25	F08x	PD01	DB08	<10	<10	<10	<10					
26	A88	PD01	DB05	<10	<10	<10	<10					
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n Mean S_r CV_r
 all labs 40 5,07 0,532 10,491

* = non tolerable mean because more than +/-

30 % from the mean

** = higher than maximum acceptable LOQ

Lower than the lowest evaluated result

| S_R CV_R
 10 0,910 17,932

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Cd Sample: 2

Unit: ng/g

No.	Lab. Code	Method code P	Method code D	Replications				n	Lab.mean	Lab.standard dev.	Recovery %
				1	2	3	4		s_i	V_i	
1	F15x	PC01	DB09	110,00	120,00	120,00	110,00	0	115,00	b	5,77 72,37
2	F03x	PD02	DB08	131,90	123,00	134,30	146,60	4	133,95	9,73 84,29	
3	F16x	PC01	DB10	141,70	140,90	139,10	140,20	4	140,48	1,10 88,40	
4	F08x	PD01	DB08	146,02	138,28	146,02	134,96	4	141,32	5,60 88,93	
5	F33	PD01	DB10	146,96	144,98	141,08	148,49	4	145,38	3,21 91,48	
6	A47	PD01	DB10	150,80	149,20	138,10	145,20	4	145,83	5,66 91,76	
7	F18x	PD99	DB10	139,00	154,00	151,00	154,00	4	149,50	7,14 94,08	
8	F12x	PC01	DB10	155,00	153,00	153,00	154,00	4	153,75	0,96 96,75	
9	F02	PD02	DB05	140,00	170,00	140,00	170,00	4	155,00	17,32 97,54	11,17
10	A36	PD02	DB10	155,22	157,89	154,26	157,25	4	156,16	1,70 98,26	
11	A45	PE99	DB10	153,00	157,00	157,00	159,00	4	156,50	2,52 98,48	
12	A60x	PD01	DB10	191,41	157,99	144,29	141,56	0	158,81	c	22,89 99,94
13	F32x	PD01	DB10	169,00	156,00	159,00	158,00	4	160,50	5,80 101,00	
14	F06x	PD02	DB08	172,00	173,00	152,00	146,00	4	160,75	13,79 101,15	
15	F05	PD02	DB05	163,00	158,00	163,00	162,00	4	161,50	2,38 101,63	
16	F14x	PC01	DB10	154,00	172,80	168,40	160,70	4	163,98	8,32 103,18	
17	F13x	PD01	DB10	157,00	162,00	166,00	171,00	4	164,00	5,94 103,20	
18	A82	PD01	DB10	169,20	160,50	168,60	159,00	4	164,33	5,32 103,40	
19	F07x	PD99	DB08	163,50	170,50	162,20	168,30	4	166,13	3,92 104,54	
20	A80	PD01	DB10	156,00	165,00	176,00	169,00	4	166,50	8,35 104,77	
21	A88	PD01	DB05	167,88	162,36	173,40	167,88	4	167,88	4,51 105,64	
22	F19x	PD02	DB08	177,00	177,00	177,00	177,00	4	177,00	0,00 111,38	
23	F25	PZ99	DB08	178,90	182,80	180,60	177,70	4	180,00	2,21 113,27	
24	F27	PD01	DB05	185,90	193,50	183,50	180,00	4	185,73	5,72 116,87	
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n Mean S_r CV_r
 all labs 88 158,92 5,510 3,467

* = non tolerable mean because more than +/-

** = higher than maximum acceptable LOQ

30 % from the mean

I S_R CV_R
 22 12,993 8,176

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Cd Sample: 3

Unit: ng/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4			V _i		
1	F08x	PD01	DB08	55,88	50,51	60,18	56,96	4	55,88	4,02	7,20	88,57
2	A47	PD01	DB10	56,40	57,10	51,00	60,30	4	56,20	3,86	6,87	89,07
3	F16x	PC01	DB10	57,13	57,45	57,29	58,49	4	57,59	0,61	1,07	91,27
4	F12x	PC01	DB10	59,00	59,00	58,00	56,00	4	58,00	1,41	2,44	91,92
5	F14x	PC01	DB10	60,10	59,10	60,10	54,77	4	58,52	2,54	4,34	92,74
6	F02	PD02	DB05	60,00	60,00	50a	60,00	3	60,00	0,00	0,00	95,09
7	A36	PD02	DB10	60,53	60,74	61,16	61,05	4	60,87	0,29	0,47	96,47
8	F32x	PD01	DB10	63,40	60,50	60,80	62,10	4	61,70	1,33	2,15	97,79
9	F18x	PD99	DB10	62,50	58,50	64,10	62,80	4	61,98	2,42	3,90	98,22
10	A45	PE99	DB10	61,90	62,40	62,20	62,40	4	62,23	0,24	0,38	98,62
11	F15x	PC01	DB09	60,00	70,00	60,00	60,00	4	62,50	5,00	8,00	99,06
12	F25	PZ99	DB08	63,40	62,60	63,00	61,60	4	62,65	0,77	1,23	99,29
13	F33	PD01	DB10	67,00	61,02	62,05	61,18	4	62,81	2,83	4,50	99,55
14	F13x	PD01	DB10	59,10	62,90	65,60	66,10	4	63,43	3,21	5,06	100,52
15	A82	PD01	DB10	66,11	65,14	61,50	63,77	4	64,13	2,00	3,12	101,64
16	A60x	PD01	DB10	68,71	61,58	68,02	64,76	4	65,77	3,28	4,99	104,23
17	F27	PD01	DB05	61,63	67,44	67,72	68,67	4	66,37	3,20	4,82	105,18
18	A80	PD01	DB10	66,50	69,60	69,00	65,60	4	67,68	1,93	2,85	107,26
19	F07x	PD99	DB08	68,32	69,61	71,49	65,93	4	68,84	2,33	3,39	109,10
20	F06x	PD02	DB08	70,00	74,00	62,00	73,00	4	69,75	5,44	7,80	110,55
21	F05	PD02	DB05	69,30	70,80	70,90	68,50	4	69,88	1,17	1,68	110,74
22	A88	PD01	DB05	70,58	69,24	71,92	70,58	4	70,58	1,09	1,55	111,86
23	F19x	PD02	DB08	85,70	85,70	85,70	85,70	0	85,70	b *	0,00	135,83
24												
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26	F03x	PD02	DB08	<50	<50	<50	<50					
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n Mean S_r CV_r
 all labs 87 63,10 2,226 3,529

30 % from the mean

* = non tolerable mean because more than +/-

** = higher than maximum acceptable LOQ

I S_R CV_R
 22 4,446 7,051

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Cd Sample: 4

Unit: ng/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %	
		P	D	1	2	3	4		\bar{x}	s_i			
1	F08x	PD01	DB08	77,19	76,12	77,19	79,33	4	77,46	1,35	1,74	76,31	
2	F03x	PD02	DB08	89,00	81,60	71,60	80,40	4	80,65	7,13	8,84	79,45	
3	F16x	PC01	DB10	90,58	93,00	90,68	91,63	4	91,47	1,12	1,23	90,11	
4	A47	PD01	DB10	92,20	89,90	94,90	91,60	4	92,15	2,08	2,25	90,78	
5	F02	PD02	DB05	90,00	100,00	90,00	100,00	4	95,00	5,77	6,08	93,59	
6	A82	PD01	DB10	97,20	98,50	96,10	95,11	4	96,73	1,46	1,51	95,29	
7	A45	PE99	DB10	97,20	96,60	99,30	98,10	4	97,80	1,17	1,20	96,35	
8	F33	PD01	DB10	105,93	100,12	98,25	98,67	4	100,74	3,55	3,52	99,25	
9	F14x	PC01	DB10	94,70	102,20	104,30	102,20	4	100,85	4,22	4,18	99,35	
10	F12x	PC01	DB10	102,00	100,00	101,00	102,00	4	101,25	0,96	0,95	99,75	
11	A60x	PD01	DB10	114,16	96,28	103,78	90,80	0	101,26	c	10,11	9,99	99,75
12	F32x	PD01	DB10	100,00	103,00	103,00	102,00	4	102,00	1,41	1,39	100,48	
13	F18x	PD99	DB10	101,00	100,00	106,00	101,00	4	102,00	2,71	2,65	100,48	
14	F05	PD02	DB05	102,00	107,00	101,00	102,00	4	103,00	2,71	2,63	101,47	
15	F13x	PD01	DB10	99,50	104,00	104,00	106,00	4	103,38	2,75	2,66	101,84	
16	A36	PD02	DB10	103,96	101,00	105,02	105,77	4	103,94	2,09	2,02	102,39	
17	F27	PD01	DB05	105,10	105,90	105,50	106,20	4	105,68	0,48	0,45	104,10	
18	A88	PD01	DB05	106,58	101,22	111,93	106,58	4	106,58	4,37	4,10	104,99	
19	F06x	PD02	DB08	107,00	111,00	110,00	107,00	4	108,75	2,06	1,90	107,13	
20	F15x	PC01	DB09	110,00	110,00	110,00	110,00	4	110,00	0,00	0,00	108,37	
21	A80	PD01	DB10	113,00	110,00	112,00	108,00	4	110,75	2,22	2,00	109,10	
22	F07x	PD99	DB08	108,90	112,30	115,10	112,90	4	112,30	2,57	2,29	110,63	
23	F25	PZ99	DB08	112,00	112,20	116,00	116,70	4	114,23	2,47	2,16	112,53	
24	F19x	PD02	DB08	118,00	118,00	118,00	118,00	4	118,00	0,00	0,00	116,25	
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all labs n Mean S_r CV_r

92 101,51 2,376 2,341

* = non tolerable mean because more than +/-

30 % from the mean

I S_R CV_R

23 9,763 9,618

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: B Sample: 1

Unit: µg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %		
		P	D	1	2	3	4		b	*	V_i			
1	F08x	PZ99	DB08	31,17	30,51	31,03	31,22	0	30,98	b	*	0,33	1,05	79,33
2	F19x	PD02	DB08	34,90	34,90	34,90	34,90	4	34,90			0,00	0,00	89,36
3	F28x	PD02	DB08	35,93	36,00	36,64	35,56	4	36,03			0,45	1,25	92,26
4	A60x	PD01	DB10	35,62	36,71	36,19	36,20	4	36,18			0,45	1,24	92,64
5	F16x	PC01	DB10	35,11	36,63	37,35	38,16	4	36,81			1,30	3,52	94,26
6	A59	PC01	DB08	36,91	37,12	37,17	37,25	4	37,11			0,15	0,39	95,03
7	A51	PD02	DB08	38,30	39,00	38,30	38,20	4	38,45			0,37	0,96	98,45
8	F24x	PD01	DB99	36,20	38,70	37,77	42,21	0	38,72	c		2,55	6,57	99,14
9	F05	PD02	DB08	39,00	39,00	39,00	38,90	4	38,98			0,05	0,13	99,80
10	F32	PD01	DB08	39,20	39,40	39,20	38,80	4	39,15			0,25	0,64	100,24
11	F18x	PD99	DB08	39,30	39,30	39,40	39,20	4	39,30			0,08	0,21	100,63
12	F14x	PC01	DB08	39,40	39,30	39,10	39,60	4	39,35			0,21	0,53	100,76
13	A65	PD01	DB08	38,60	40,40	39,70	39,50	4	39,55			0,74	1,88	101,27
14	F02x	PD02	DB08	40,03	41,29	39,33	39,64	4	40,07			0,86	2,15	102,61
15	F33x	PD01	DB10	37,99	40,06	40,81	43,82	0	40,67	c		2,41	5,94	104,14
16	F15x	PC01	DB08	40,80	41,00	41,60	40,80	4	41,05			0,38	0,92	105,11
17	A88	PD01	DB08	41,12	39,71	42,54	41,12	4	41,12			1,16	2,81	105,29
18	F07x	PD99	DB08	41,51	41,46	41,48	40,79	4	41,31			0,35	0,84	105,77
19	A36	PD02	DB08	42,31	41,78	41,78	41,78	4	41,91			0,26	0,63	107,32
20	A47	PD01	DB10	41,30	41,60	43,50	44,20	4	42,65			1,42	3,33	109,21
21	A80	PD01	DB10	47,00	48,10	47,90	48,60	0	47,90	b	*	0,67	1,40	122,65
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* = non tolerable mean because more than +/-

n Mean s_r CV_r
 all labs 68 39,05 0,498 1,275
 20 % from the mean

I s_R CV_R
 17 2,232 5,715

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: B Sample: 2

Unit: µg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		Lab.mean	V_i		
1	F08x	PZ99	DB08	18,91	18,90	19,02	18,69	4	18,88		0,14	81,67
2	A60x	PD01	DB10	21,20	20,51	19,61	19,81	4	20,28		0,72	87,73
3	F19x	PD02	DB08	20,70	20,70	20,70	20,70	4	20,70		0,00	89,54
4	A51	PD02	DB08	22,40	22,20	21,20	21,00	4	21,70		0,70	93,86
5	A59	PC01	DB08	21,83	21,90	21,92	22,31	4	21,99		0,22	95,12
6	F16x	PC01	DB10	22,15	22,10	21,59	22,42	4	22,07		0,35	95,44
7	F05	PD02	DB08	22,60	22,40	22,40	22,50	4	22,48		0,10	97,22
8	F33x	PD01	DB10	22,28	24,49	22,14	21,88	4	22,70		1,21	98,18
9	F28x	PD02	DB08	22,54	22,40	22,81	23,10	4	22,71		0,31	98,24
10	F18x	PD99	DB08	23,20	22,60	22,80	22,80	4	22,85		0,25	98,84
11	A65	PD01	DB08	23,30	23,20	22,90	22,80	4	23,05		0,24	99,70
12	F32	PD01	DB08	23,00	23,00	23,50	23,50	4	23,25		0,29	100,57
13	F14x	PC01	DB08	23,70	24,30	23,90	23,90	4	23,95		0,25	103,60
14	A36	PD02	DB08	23,93	24,04	24,04	24,14	4	24,04		0,09	103,98
15	F07x	PD99	DB08	24,69	24,41	24,01	24,44	4	24,39		0,28	105,49
16	F15x	PC01	DB08	24,90	24,70	24,00	24,10	4	24,43		0,44	105,65
17	F02x	PD02	DB08	23,39	24,76	23,18	26,71	0	24,51	c	1,63	106,02
18	A47	PD01	DB10	25,40	24,80	25,40	24,70	4	25,08		0,38	108,46
19	F24x	PD01	DB99	24,78	26,76	24,08	25,45	4	25,27		1,14	109,30
20	A88	PD01	DB08	26,07	26,45	25,70	26,07	4	26,07		0,31	112,78
21	A80	PD01	DB10	26,90	26,40	26,20	26,50	4	26,50		0,29	114,63
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* = non tolerable mean because more than +/-

all labs n Mean S_r CV_r
20 **23,12** **0,385** **1,665**

% from the mean
20 S_R CV_R
1,927 **8,335**

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: B Sample: 3

Unit: µg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		b	*	V_i	
1	A60x	PD01	DB10	5,01	4,40	3,61	4,89	0	4,48	b *	0,64	14,24
2	F19x	PD02	DB08	5,68	5,68	5,68	5,68	4	5,68		0,00	0,00
3	F08x	PZ99	DB08	5,79	5,77	5,95	5,82	4	5,83		0,08	1,34
4	F05	PD02	DB08	5,89	5,99	5,90	5,91	4	5,92		0,05	0,77
5	F02x	PD02	DB08	6,06	6,30	6,02	6,32	4	6,18		0,16	2,54
6	F18x	PD99	DB08	6,33	6,15	6,27	6,20	4	6,24		0,08	1,26
7	A59	PC01	DB08	6,24	6,28	6,23	6,34	4	6,27		0,05	0,80
8	A65	PD01	DB08	6,80	6,20	6,10	6,30	4	6,35		0,31	4,90
9	F16x	PC01	DB10	6,58	6,50	6,44	6,33	4	6,46		0,10	1,62
10	A36	PD02	DB08	6,53	6,40	6,46	6,51	4	6,48		0,06	0,90
11	F14x	PC01	DB08	6,60	6,60	6,40	6,50	4	6,53		0,10	1,47
12	F32	PD01	DB08	6,51	6,60	6,52	6,57	4	6,55		0,04	0,65
13	F15x	PC01	DB08	6,90	7,00	6,60	6,70	4	6,80		0,18	2,68
14	F33x	PD01	DB10	6,54	6,66	6,71	7,46	4	6,84		0,42	6,11
15	F07x	PD99	DB08	6,99	7,04	7,03	6,82	4	6,97		0,10	1,46
16	A47	PD01	DB10	6,75	8,06	7,15	7,10	4	7,27		0,56	7,70
17	A88	PD01	DB08	7,27	7,48	7,06	7,27	4	7,27		0,17	2,36
18	A80	PD01	DB10	7,78	7,73	7,52	7,40	4	7,61		0,18	2,34
19	F28x	PD02	DB08	7,26	7,76	7,94	7,80	4	7,69		0,29	3,83
20	F24x	PD01	DB99	6,48	8,30	6,88	10,62	0	8,07	c *	1,87	23,18
21												
22												
23	A51	PD02	DB08	<3,5	<3,5	<3,5	<3,5			**		
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n Mean S_r CV_r
 all labs 72 6,61 0,163 2,461

* = non tolerable mean because more than +/-

** = higher than maximum acceptable LOQ

20 % from the mean

I S_R CV_R
 18 0,581 8,797

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: B Sample: 4

Unit: µg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4			V _i		
1	A51	PD02	DB08	8,88	10,70	9,68	9,56	4	9,71	*	0,75	74,85
2	A60x	PD01	DB10	10,61	10,40	9,66	9,69	4	10,09	*	0,49	77,81
3	F08x	PZ99	DB08	10,65	10,89	11,05	11,08	4	10,92		0,20	84,19
4	F19x	PD02	DB08	11,70	11,70	11,70	11,70	4	11,70		0,00	90,23
5	F16x	PC01	DB10	12,36	12,99	12,59	12,63	4	12,64		0,26	97,50
6	F05	PD02	DB08	13,00	13,00	13,00	13,00	4	13,00		0,00	100,26
7	F02x	PD02	DB08	13,29	13,28	12,96	12,55	4	13,02		0,35	100,41
8	A59	PC01	DB08	12,95	13,10	13,14	13,05	4	13,06		0,08	100,72
9	F18x	PD99	DB08	13,10	13,00	13,10	13,10	4	13,08		0,05	100,84
10	A65	PD01	DB08	12,90	13,20	13,30	12,90	4	13,08		0,21	100,84
11	F32	PD01	DB08	13,30	13,20	13,20	13,00	4	13,18		0,13	101,61
12	F28x	PD02	DB08	13,12	13,66	12,84	13,19	4	13,20		0,34	101,82
13	F14x	PC01	DB08	13,70	13,40	13,50	13,90	4	13,63		0,22	105,08
14	F15x	PC01	DB08	13,80	13,50	13,70	13,60	4	13,65		0,13	105,27
15	F33x	PD01	DB10	14,22	13,60	13,24	13,56	4	13,66		0,41	105,31
16	A47	PD01	DB10	14,30	13,80	14,00	13,40	4	13,88		0,38	107,01
17	F07x	PD99	DB08	14,19	13,96	13,98	13,89	4	14,01		0,13	108,01
18	F24x	PD01	DB99	11,95	16,01	13,48	15,40	0	14,21	c	1,85	109,59
19	A36	PD02	DB08	14,09	13,99	14,52	14,31	4	14,23		0,24	109,72
20	A88	PD01	DB08	14,36	14,48	14,24	14,36	4	14,36		0,10	110,75
21	A80	PD01	DB10	15,50	15,20	15,40	15,00	4	15,28		0,22	117,80
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* = non tolerable mean because more than +/-

n Mean S_r CV_r
 all labs 80 12,97 0,234 1,801
 20 % from the mean

I S_R CV_R
 20 1,397 10,777

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: As Sample: 1

Unit: ng/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		s_i	V_i		
1	F14x	PC01	DB10	117,70	109,1a	118,80	118,80	3	118,43		0,64	93,62
2	F12x	PC01	DB10	117,00	120,00	119,00	120,00	4	119,00		1,41	94,07
3	A82	PD01	DB10	120,80	121,50	119,90	119,50	4	120,43		0,90	95,20
4	F08	PD01	DB10	132,52	121,75	121,75	126,06	4	125,52		5,09	99,22
5	A36	PD02	DB10	125,97	119,49	128,84	129,58	4	125,97		4,59	99,58
6	A47	PD01	DB10	114,50	124,50	140,20	126,20	4	126,35		10,58	99,88
7	F13	PD01	DB10	122,00	122,00	131,00	132,00	4	126,75		5,50	100,20
8	F33	PD01	DB10	123,04	126,80	132,11	136,91	4	129,72		6,07	102,54
9	F16x	PD01	DB10	133,60	130,00	130,40	135,20	4	132,30		2,52	104,59
10	F32	PD01	DB10	129,00	130,00	151,00	144,00	4	138,50		10,79	109,49
11	A80	PD01	DB10	150,00	158,00	166,00	157,00	0	157,75	b *	6,55	124,71
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* = non tolerable mean because more than +/-

all labs n Mean s_r CV_r
39 **126,50** **4,808** **3,801**
20 % from the mean

I s_r CV_r
10 **6,210** **4,917**

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: As Sample: 2

Unit: ng/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4			V _i		
1	A82	PD01	DB10	98,76	104,60	100,10	105,00	4	102,12		3,15	88,02
2	F14x	PC01	DB10	104,50	101,20	107,80	101,20	4	103,68		3,16	89,36
3	F13	PD01	DB10	109,00	106,00	110,00	101,00	4	106,50		4,04	91,80
4	A36	PD02	DB10	113,45	105,86	116,55	107,89	4	110,94		4,93	95,62
5	F16x	PD01	DB10	117,50	108,10	113,60	111,70	4	112,73		3,92	97,16
6	F08	PD01	DB10	120,58	121,69	117,26	109,52	4	117,26		5,49	101,07
7	F32	PD01	DB10	117,00	136,00	101,00	131,00	4	121,25		15,71	104,51
8	F12x	PC01	DB10	123,00	121,00	125,00	120,00	4	122,25		2,22	105,37
9	A80	PD01	DB10	107,00	126,00	124,00	139,00	4	124,00		13,14	106,88
10	A47	PD01	DB10	128,80	139,30	118,40	120,30	4	126,70		9,54	109,21
11	F33	PD01	DB10	129,79	125,53	119,63	140,16	4	128,78		8,66	111,00
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all labs n Mean s_r CV_r
44 **116,02** **6,724** **5,795**

* = non tolerable mean because more than +/-

20 % from the mean

I S_R CV_R
11 **9,388** **8,092**

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: As Sample: 3

Unit: ng/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		Lab.mean	V_i		
1	A36	PD02	DB10	5,81	5,81	5,92	6,02	4	5,89	*	0,10	72,61
2	F33	PD01	DB10	7,70	7,39	7,58	6,66	4	7,33		0,47	90,39
3	A82	PD01	DB10	7,61	7,83	9,359a	7,73	3	7,73		0,11	95,25
4	F16x	PD01	DB10	7,09	6,88	9,82	8,72	4	8,13		1,39	100,20
5	F13	PD01	DB10	8,30	9,20	8,70	7,00	4	8,30		0,94	102,31
6	A80	PD01	DB10	13,00	11,00	9,80	11,00	4	11,20	*	1,33	138,06
7												
8												
9	F14x	PC01	DB10	<40	<40	<40	<40					
10	F32	PD01	DB10	<20	<20	<20	<20					
11	A47	PD01	DB10	<20	<20	<20	<20					
12	F12x	PC01	DB10	<11	<11	<11	<11					
13	F08	PD01	DB10	33,31	20,42	<20	<20			*		
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n Mean s_r CV_r
 all labs 23 8,11 0,723 8,913
 30 % from the mean

* = non tolerable mean because more than +/-

Lower than the lowest evaluated result

| s_r CV_r
 6 1,747 21,580

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: As Sample: 4

Unit: ng/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		Lab.mean	V_i		
1	A82	PD01	DB10	24,85	24,58	24,42	24,71	4	24,64		0,18	90,55
2	F16x	PD01	DB10	24,98	26,38	23,24	25,36	4	24,99		1,31	91,84
3	F33	PD01	DB10	27,46	25,70	24,48	25,03	4	25,67		1,29	94,33
4	A47	PD01	DB10	24,80	28,30	23,50	26,70	4	25,83		2,11	94,90
5	A36	PD02	DB10	26,81	26,07	26,60	26,60	4	26,52		0,32	97,46
6	F13	PD01	DB10	26,80	25,50	27,60	27,30	4	26,80		0,93	98,49
7	F12x	PC01	DB10	27,00	28,00	27,00	30,00	4	28,00		1,41	102,90
8	F08	PD01	DB10	35,38	25,73	35,38	34,31	0	32,70	C	4,67	120,16
9	A80	PD01	DB10	33,30	36,90	33,70	37,10	4	35,25		2,03	129,54
10												
11												
12	F14x	PC01	DB10	<40	<40	<40	<40					
13	F32	PD01	DB10	<20	<20	<20	<20					
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n Mean s_r CV_r
 all labs 32 27,21 1,198 4,402

* = non tolerable mean because more than +/- 30 % from the mean

Limit for the lower concentration range	I	s_r	CV_r
	8	3,417	12,558

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Cr Sample: 1

Unit: µg/g

No.	Lab. Code	Method code P	Method code D	Replications				n	Lab.mean		Lab.standard dev.	Recovery
		P	D	1	2	3	4		s _i	V _i	%	
1	A47	PD01	DB10	0,30	0,35	0,51	0,41	4	0,39		0,09	69,59
2	F08	PD01	DB10	0,48	0,49	0,47	0,49	4	0,48		0,01	85,28
3	F03x	PD02	DB08	0,46	0,54	0,44	0,49	4	0,48		0,04	85,64
4	F12x	PC01	DB10	0,50	0,49	0,50	0,51	4	0,50		0,01	88,34
5	F19x	PD02	DB08	0,52	0,52	0,52	0,52	4	0,52		0,00	91,31
6	A60x	PD01	DB10	0,51	0,48	0,55	0,54	4	0,52		0,03	92,00
7	F06	PD02	DB08	0,53	0,53	0,52	0,50	4	0,52		0,01	92,20
8	F33	PD01	DB10	0,58	0,48	0,59	0,58	4	0,56		0,05	99,20
9	A36	PD02	DB10	0,58	0,57	0,58	0,57	4	0,58		0,01	102,26
10	F16x	PC01	DB10	0,62	0,54	0,67	0,58	4	0,60		0,05	107,10
11	A80	PD01	DB10	0,59	0,68	0,58	0,62	4	0,62		0,04	109,39
12	F32	PD01	DB10	0,64	0,63	0,64	0,64	4	0,64		0,01	112,72
13	F18x	PD99	DB10	0,67	0,68	0,71	0,65	4	0,68		0,02	120,12
14	A82	PD01	DB10	0,67	0,70	0,70	0,67	4	0,68		0,02	121,33
15	F13x	PD01	DB10	0,66	0,76	0,68	0,69	4	0,70		0,04	123,53
16	A88	PD01	DB08	1,05	1,14	0,97	1,05	0	1,05	b *	0,07	186,61
17	F27	PD01	DB05	1,05	0,87	0,96	1,35	0	1,06	b *	0,21	187,40
18												
19												
20	F02x	PD02	DB08	<1	<1	<1	<1					
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* = non tolerable mean because more than +/-

n Mean S_r CV_r
 all labs 60 0,56 0,030 5,338
 35 % from the mean

Limit for the lower concentration range

| S_R CV_R
 15 0,088 15,593

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Cr Sample: 2

Unit: µg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		Lab.mean	V_i		
1	F33	PD01	DB10	0,66	0,65	0,66	0,65	4	0,65		0,01	69,89
2	A60x	PD01	DB10	0,80	0,85	0,75	0,88	4	0,82		0,05	87,39
3	F03x	PD02	DB08	0,88	0,78	0,79	0,87	4	0,83		0,05	88,88
4	A36	PD02	DB10	0,83	0,83	0,84	0,84	4	0,83		0,01	88,91
5	A47	PD01	DB10	0,88	0,89	0,85	0,79	4	0,85		0,04	90,99
6	F06	PD02	DB08	0,89	0,83	0,83	0,91	4	0,87		0,04	92,33
7	F08	PD01	DB10	0,85	0,90	0,99	0,97	4	0,93		0,07	98,86
8	F19x	PD02	DB08	0,94	0,94	0,94	0,94	4	0,94		0,00	100,33
9	A88	PD01	DB08	0,95	0,78	1,11	0,95	4	0,95		0,13	101,13
10	F12x	PC01	DB10	0,93	1,00	0,98	0,90	4	0,95		0,05	101,59
11	A80	PD01	DB10	0,88	0,95	1,14	0,99	4	0,99		0,11	105,75
12	F13x	PD01	DB10	0,94	1,00	0,97	1,15	4	1,02		0,09	108,39
13	F32	PD01	DB10	1,08	1,06	0,98	1,00	4	1,03		0,05	109,94
14	F18x	PD99	DB10	1,08	1,00	1,09	1,04	4	1,05		0,04	112,34
15	A82	PD01	DB10	1,11	1,09	1,00	1,05	4	1,06		0,05	113,38
16	F27	PD01	DB05	1,32	1,22	1,24	1,10	4	1,22		0,09	129,90
17	F16x	PC01	DB10	2,87	2,90	3,06	2,92	0	2,94	b *	0,08	313,35
18												
19												
20	F02x	PD02	DB08	<1	<1	<1	1,16					
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* = non tolerable mean because more than +/-

n Mean s_r CV_r
 all labs 64 0,94 0,056 5,934
 35 % from the mean

Limit for the lower concentration range

| S_R CV_R
 16 0,130 13,869

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Cr Sample: 3

Unit: µg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		Lab.mean	V_i		
1	A36	PD02	DB10	0,27	0,23	0,24	0,24	4	0,24		0,02	82,93
2	F32	PD01	DB10	0,28	0,23	0,23	0,26	4	0,25		0,02	84,46
3	A60x	PD01	DB10	0,26	0,24	0,24	0,27	4	0,25		0,02	85,85
4	F13x	PD01	DB10	0,27	0,26	0,29	0,27	4	0,27		0,01	92,52
5	F08	PD01	DB10	0,28	0,28	0,25	0,29	4	0,27		0,02	93,19
6	A80	PD01	DB10	0,27	0,27	0,31	0,28	4	0,28		0,02	95,06
7	A88	PD01	DB08	0,29	0,37	0,21	0,29	4	0,29		0,07	98,37
8	F12x	PC01	DB10	0,29	0,30	0,29	0,33	4	0,30		0,02	101,67
9	F06	PD02	DB08	0,31	0,30	0,29	0,31	4	0,30		0,01	102,61
10	A82	PD01	DB10	0,33	0,30	0,32	0,30	4	0,31		0,01	104,90
11	F19x	PD02	DB08	0,31	0,31	0,31	0,31	4	0,31		0,00	105,49
12	F18x	PD99	DB10	0,37	0,32	0,44	0,31	4	0,36		0,06	121,35
13	F33	PD01	DB10	0,42	0,41	0,34	0,38	4	0,39		0,03	131,61
14	F27	PD01	DB05	0,54	0,83	0,44	0,49	0	0,58	b *	0,18	30,45
15	F16x	PC01	DB10	1,71	1,84a	1,69	1,72	0	1,71	b *	0,02	578,89
16												
17												
18	F02x	PD02	DB08	<1	<1	<1	<1					
19	F03x	PD02	DB08	<,4	<,4	<,4	<,4					
20	A47	PD01	DB10	<,01	0,08	<,01	0,06			*		
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n Mean s_r CV_r
 all labs 52 0,29 0,023 7,958
 35 % from the mean

* = non tolerable mean because more than +/-

Lower than the lowest evaluated result | s_R CV_R
 13 0,042 14,086

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Cr Sample: 4

Unit: µg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		s_i	V_i		
1	A47	PD01	DB10	0,45	0,45	0,42	0,60	4	0,48		0,08	16,93
2	F03x	PD02	DB08	0,53	0,63	0,54	0,54	4	0,56		0,05	8,15
3	F12x	PC01	DB10	0,60	0,61	0,62	0,61	4	0,61		0,01	1,11
4	A60x	PD01	DB10	0,62	0,63	0,63	0,64	4	0,63		0,01	1,54
5	F08	PD01	DB10	0,59	0,62	0,62	0,71	4	0,64		0,05	7,91
6	F16x	PC01	DB10	0,64	0,68	0,62	0,66	4	0,65		0,03	4,02
7	F33	PD01	DB10	0,72	0,66	0,63	0,63	4	0,66		0,04	6,34
8	A36	PD02	DB10	0,64	0,66	0,68	0,71	4	0,67		0,03	3,99
9	F06	PD02	DB08	0,73	0,64	0,71	0,63	4	0,68		0,05	7,37
10	F32	PD01	DB10	0,69	0,71	0,72	0,73	4	0,71		0,02	2,46
11	A82	PD01	DB10	0,71	0,70	0,69	0,75	4	0,71		0,03	3,82
12	F13x	PD01	DB10	0,70	0,73	0,72	0,78	4	0,73		0,04	4,84
13	F19x	PD02	DB08	0,75	0,75	0,75	0,75	4	0,75		0,00	0,00
14	A80	PD01	DB10	0,81	0,75	0,82	0,74	4	0,78		0,04	4,96
15	F18x	PD99	DB10	0,88	0,84	0,82	0,83	4	0,84		0,02	2,80
16	A88	PD01	DB08	0,85	1,10	0,59	0,85	0	0,85	c	0,21	24,57
17	F27	PD01	DB05	1,24	1,21	1,03	0,96	0	1,11	b *	0,14	12,24
18												
19												
20	F02x	PD02	DB08	<1	<1	<1	<1					
21												
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n Mean s_r CV_r
 all labs 60 0,67 0,032 4,757

* = non tolerable mean because more than +/- 35 % from the mean

Limit for the lower concentration range		s_r	CV_r
	15	0,089	13,199

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Co Sample: 1

Unit: µg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev.	Recovery
		P	D	1	2	3	4		s _i	V _i	%	
1	F08	PD01	DB10	0,06	0,06	0,06	0,06	4	0,06		0,00	82,81
2	F12x	PC01	DB10	0,06	0,06	0,06	0,06	4	0,06		0,00	86,12
3	F16x	PC01	DB10	0,06	0,06	0,06	0,06	4	0,06		0,00	89,58
4	A36	PD02	DB10	0,06	0,07	0,06	0,06	4	0,06		0,00	92,74
5	A60x	PD01	DB10	0,07	0,06	0,07	0,06	4	0,07		0,01	98,12
6	A82	PD01	DB10	0,07	0,07	0,07	0,07	4	0,07		0,00	99,33
7	A45	PE99	DB10	0,08	0,07	0,07	0,06	4	0,07		0,01	101,80
8	F13x	PD01	DB10	0,07	0,07	0,07	0,07	4	0,07		0,00	103,31
9	F32	PD01	DB10	0,07	0,07	0,07	0,07	4	0,07		0,00	105,99
10	F33x	PD01	DB10	0,07	0,07	0,08	0,07	4	0,07		0,00	109,67
11	A47	PD01	DB10	0,07	0,10	0,07	0,06	0	0,08	c	0,02	110,41
12	A80	PD01	DB10	0,08	0,07	0,07	0,08	4	0,08		0,00	111,66
13	F14x	PC01	DB10	0,08	0,08	0,080	0,08	4	0,08		0,00	118,87
14												
15												
16	F03x	PD02	DB08	<,1	<,1	<,1	<,1					
17												
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n Mean S_r CV_r
 all labs 48 0,07 0,003 4,055
 35 % from the mean

* = non tolerable mean because more than +/-

Limit for the lower concentration range

I S_R CV_R
 12 0,007 10,827

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Co Sample: 2

Unit: µg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		V _i			
1	F08	PD01	DB10	0,11	0,11	0,11	0,12	4	0,11		0,01	85,73
2	A36	PD02	DB10	0,12	0,13	0,12	0,12	4	0,12		0,01	93,37
3	F12x	PC01	DB10	0,13	0,13	0,12	0,12	4	0,12		0,00	93,94
4	A45	PE99	DB10	0,14	0,11	0,12	0,13	4	0,12		0,01	94,90
5	A60x	PD01	DB10	0,13	0,14	0,12	0,12	4	0,13		0,01	95,87
6	F13x	PD01	DB10	0,12	0,12	0,13	0,14	4	0,13		0,01	97,57
7	A82	PD01	DB10	0,13	0,12	0,13	0,13	4	0,13		0,00	98,89
8	A47	PD01	DB10	0,13	0,15	0,12	0,13	4	0,13		0,01	101,20
9	F32	PD01	DB10	0,14	0,14	0,14	0,13	4	0,14		0,00	103,87
10	F16x	PC01	DB10	0,13	0,14	0,14	0,14	4	0,14		0,00	105,69
11	F14x	PC01	DB10	0,14	0,14	0,14	0,14	3	0,14		0,00	108,20
12	F33x	PD01	DB10	0,15	0,15	0,14	0,15	4	0,14		0,00	110,55
13	A80	PD01	DB10	0,12	0,15	0,15	0,17	4	0,15		0,02	112,27
14												
15												
16	F03x	PD02	DB08	<,1	<,1	<,1	<,1					
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n Mean s_r CV_r
 all labs 51 0,13 0,007 5,127

* = non tolerable mean because more than +/-

25 % from the mean

I s_R CV_R
 13 0,010 7,691

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Co Sample: 3

Unit: µg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		\bar{x}	S_i	V_i	
1	F12x	PC01	DB10	0,15	0,16	0,16	0,14	4	0,15		0,01	4,08 89,61
2	F03x	PD02	DB08	0,16	0,15	0,16	0,14	4	0,15		0,01	6,28 90,05
3	F14x	PC01	DB10	0,16	0,17	0,17	0,16	4	0,16		0,00	2,35 96,99
4	A36	PD02	DB10	0,17	0,17	0,16	0,17	4	0,17		0,00	2,05 98,17
5	A60x	PD01	DB10	0,17	0,16	0,17	0,17	4	0,17		0,01	3,05 98,48
6	A47	PD01	DB10	0,16	0,17	0,16	0,18	4	0,17		0,01	5,72 98,91
7	F08	PD01	DB10	0,16	0,17	0,18	0,17	4	0,17		0,01	3,69 99,94
8	F13x	PD01	DB10	0,16	0,17	0,18	0,18	4	0,17		0,01	6,51 101,42
9	A45	PE99	DB10	0,18	0,17	0,17	0,17	4	0,17		0,00	1,73 102,01
10	F33x	PD01	DB10	0,17	0,17	0,18	0,18	4	0,17		0,00	1,65 102,90
11	A82	PD01	DB10	0,18	0,17	0,18	0,17	4	0,18		0,00	2,47 103,72
12	F32	PD01	DB10	0,18	0,17	0,18	0,18	4	0,18		0,00	1,86 103,93
13	F16x	PC01	DB10	0,18	0,17	0,18	0,18	4	0,18		0,00	0,96 103,96
14	A80	PD01	DB10	0,19	0,19	0,19	0,19	3	0,19		0,00	0,30 113,18
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n Mean s_r CV_r
 all labs 55 0,17 0,005 2,987

* = non tolerable mean because more than +/-

25 % from the mean

I s_r CV_r
 14 0,010 5,903

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Co Sample: 4

Unit: µg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %	
		P	D	1	2	3	4		V _i				
1	A45	PE99	DB10	0,05	0,05	0,05	0,05	4	0,05		0,00	6,80	85,57
2	F08	PD01	DB10	0,05	0,05	0,05	0,06	4	0,05		0,00	7,22	87,41
3	A47	PD01	DB10	0,05	0,05	0,06	0,05	4	0,05		0,01	9,52	92,25
4	F12x	PC01	DB10	0,05	0,05	0,05	0,05	4	0,05		0,00	1,82	92,68
5	F16x	PC01	DB10	0,06	0,05	0,05	0,05	4	0,05		0,00	1,94	95,28
6	A82	PD01	DB10	0,06	0,06	0,05	0,05	4	0,06		0,00	1,53	96,86
7	A60x	PD01	DB10	0,06	0,05	0,06	0,05	4	0,06		0,00	4,36	97,82
8	A36	PD02	DB10	0,06	0,06	0,06	0,06	4	0,06		0,00	0,88	99,71
9	F32	PD01	DB10	0,06	0,06	0,06	0,06	4	0,06		0,00	0,85	103,23
10	F13x	PD01	DB10	0,05	0,06	0,06	0,06	4	0,06		0,00	6,55	104,33
11	F14x	PC01	DB10	0,06	0,06	0,06	0,06	4	0,06		0,00	2,94	108,94
12	A80	PD01	DB10	0,07	0,06	0,07	0,06	4	0,07		0,00	4,21	115,13
13	F33x	PD01	DB10	0,07	0,07	0,07	0,07	4	0,07		0,00	4,50	120,80
14													
15													
16	F03x	PD02	DB08	<,1	<,1	<,1	<,1						
17													
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n Mean s_r CV_r
 all labs 52 0,06 0,002 4,021

* = non tolerable mean because more than +/- 35 % from the mean

Limit for the lower concentration range | s_R CV_R
 13 0,006 10,359

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Hg Sample: 1

Unit: ng/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		\bar{x}	V_i		
1	A88	PD01	DA05	20,00	20,00	20,00	20,00	4	20,00	c	0,00	77,07
2	F08	PD01	DB03	23,70	19,39	21,55	16,16	0	20,20		3,22	77,84
3	F12x	PC01	DB10	22,20	21,70	21,00	21,20	4	21,53		0,54	82,94
4	F18x	PD99	DA05	25,70	24,60	24,20	25,90	4	25,10		0,83	96,72
5	F03x	PZ98	DA05	24,79	24,79	25,86	25,86	4	25,33		0,62	97,59
6	A36	PD02	DB03	25,83	24,34	23,92	28,28	4	25,59		1,97	98,62
7	F32x	PZ98	DA05	25,50	25,60	25,80	26,00	4	25,73		0,22	99,13
8	A60x	PD01	DB10	24,72	28,48	25,92	24,14	4	25,82		1,93	99,47
9	A45	PZ98	DA05	25,40	26,40	25,20	27,00	4	26,00		0,85	100,19
10	F16x	PC01	DB10	27,48	26,58	25,60	26,07	4	26,43		0,80	101,85
11	F13x	PZ98	DA05	27,30	27,20	27,20	26,70	4	27,10		0,27	104,43
12	A82	PZ98	DA05	29,00	28,81	27,74	27,67	4	28,31		0,70	109,07
13	F02x	PZ98	DA05	31,2a	28,70	28,30	28,30	3	28,43		0,23	109,56
14	F24	PZ98	DA05	29,37	27,97	28,16	29,42	4	28,73		0,77	110,71
15	F28x	PZ98	DA05	30,21	29,40	30,20	29,61	4	29,86		0,41	115,04
16										*		
17												
18	A47	PD01	DB10	<10	<10	<10	<10					
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n Mean S_r CV_r
 all labs 55 25,95 0,724 2,791

* = non tolerable mean because more than +/-

30 % from the mean

Limit for the lower concentration range		S_R	CV_R
	14	2,668	10,262

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Hg Sample: 2

Unit: ng/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		b	V_i		
1	F08	PD01	DB03	50,89	42,04	36,51	30,98	0	40,10	*	8,49	66,97
2	F12x	PC01	DB10	49,20	50,40	40,50	41,00	4	45,28	*	5,25	75,61
3	A88	PD01	DA05	50,00	50,00	50,00	50,00	4	50,00	0,00	0,00	83,50
4	A36	PD02	DB03	55,23	52,13	53,84	49,57	4	52,69	2,44	4,63	88,00
5	F32x	PZ98	DA05	58,10	55,60	56,00	57,90	4	56,90	1,28	2,26	95,03
6	F18x	PD99	DA05	57,90	57,60	59,60	58,90	4	58,50	0,92	1,57	97,70
7	F03x	PZ98	DA05	58,52	61,84	59,63	57,42	4	59,35	1,89	3,18	99,12
8	A60x	PD01	DB10	61,33	59,34	58,73	60,15	4	59,89	1,12	1,88	100,01
9	F16x	PC01	DB10	60,42	61,73	60,53	59,99	4	60,67	0,75	1,23	101,32
10	A45	PZ98	DA05	61,30	60,50	60,20	63,50	4	61,38	1,49	2,43	102,50
11	F02x	PZ98	DA05	60,10	63,20	61,10	62,20	4	61,65	1,34	2,18	102,96
12	F13x	PZ98	DA05	63,70	64,20	63,70	62,10	4	63,43	0,91	1,44	105,92
13	A82	PZ98	DA05	67,12	67,82	68,55	65,56	4	67,26	1,28	1,90	112,33
14	F28x	PZ98	DA05	68,55	71,20	70,35	68,40	4	69,63	1,37	1,97	116,28
15	F24	PZ98	DA05	73,55	70,74	70,93	71,54	4	71,69	1,29	1,79	119,73
16												
17												
18	A47	PD01	DB10	<10	<10	<10	<10			*		
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* = non tolerable mean because more than +/-

n Mean S_r CV_r
 all labs 56 59,88 1,524 2,545
 20 % from the mean

I S_R CV_R
 14 7,238 12,089

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Hg Sample: 3

Unit: ng/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %	
		P	D	1	2	3	4			V _i			
1	A45	PZ98	DA05	6,51	6,13	6,04	5,71	4	6,10	*	0,33	5,40	67,45
2	F12x	PC01	DB10	6,75	7,39	7,91	6,92	4	7,24		0,52	7,19	80,12
3	F03x	PZ98	DA05	8,61	7,53	8,61	8,61	4	8,34		0,54	6,47	92,26
4	F18x	PD99	DA05	9,22	8,31	7,92	8,38	4	8,46		0,55	6,47	93,56
5	A60x	PD01	DB10	8,82	8,88	8,57	8,57	4	8,71		0,16	1,89	96,34
6	F24	PZ98	DA05	9,06	8,81	8,94	9,19	4	9,00		0,16	1,81	99,56
7	A36	PD02	DB03	9,82	8,87	9,08	9,93	4	9,43		0,53	5,61	104,26
8	F16x	PC01	DB10	9,22	9,93	9,94	9,95	4	9,76		0,36	3,70	107,95
9	A88	PD01	DA05	10,00	10,00	10,00	10,00	4	10,00		0,00	0,00	110,62
10	F13x	PZ98	DA05	10,50	9,95	9,58	9,97	4	10,00		0,38	3,79	110,62
11	F28x	PZ98	DA05	9,97	10,19	9,83	10,19	4	10,05		0,18	1,76	111,12
12	F32x	PZ98	DA05	10,7a	10,30	10,20	10,30	3	10,27		0,06	0,56	113,57
13	A82	PZ98	DA05	10,38	10,82	10,25	10,48	4	10,48		0,24	2,33	115,96
14	F02x	PZ98	DA05	15,60	13,80	12,80	13,90	0	14,03	b *	1,16	8,28	155,15
15													
16													
17	A47	PD01	DB10	<10	<10	<10	<10						
18	F08	PD01	DB03	<10	<10	<10	<10						
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n Mean s_r CV_r
 all labs 51 9,04 0,309 3,413

* = non tolerable mean because more than +/- 30 % from the mean

Lower than the lowest evaluated result | S_R CV_R
 13 1,289 14,217

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Hg Sample: 4

Unit: ng/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		b	V_i		
1	A88	PD01	DA05	20,00	20,00	20,00	20,00	0	20,00	b *	0,00	64,64
2	F12x	PC01	DB10	24,40	24,20	22,60	21,00	0	23,05	b	1,59	74,50
3	F18x	PD99	DA05	27,40	27,70	27,20	28,00	4	27,58		0,35	89,13
4	A36	PD02	DB03	29,36	27,45	28,51	31,58	4	29,23		1,75	94,46
5	A45	PZ98	DA05	29,30	29,30	29,30	29,40	4	29,33		0,05	94,78
6	F03x	PZ98	DA05	29,02	30,09	30,09	30,09	4	29,82		0,53	96,39
7	F16x	PC01	DB10	31,05	31,05	30,53	29,60	4	30,56		0,68	98,77
8	F28x	PZ98	DA05	29,92	30,70	30,56	31,20	4	30,60		0,53	98,89
9	A60x	PD01	DB10	30,12	31,92	30,39	30,17	4	30,65		0,85	99,07
10	F32x	PZ98	DA05	30,70	31,20	30,70	30,30	4	30,73		0,37	99,31
11	F13x	PZ98	DA05	31,90	31,80	31,60	31,40	4	31,68		0,22	102,38
12	A82	PZ98	DA05	31,44	33,49	31,84	31,58	4	32,09		0,95	103,71
13	F08	PD01	DB03	32,16	34,31	33,23	21,441a	3	33,23		1,07	107,42
14	F24	PZ98	DA05	33,37	33,16	33,52	33,69	4	33,44		0,23	108,07
15	F02x	PZ98	DA05	34,80	34,60	32,90	33,20	4	33,88		0,96	109,49
16												
17												
18	A47	PD01	DB10	<10	<10	<10	<10			*		
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n Mean s_r CV_r
 all labs 51 30,94 0,658 2,127

* = non tolerable mean because more than +/- 30 % from the mean

Limit for the lower concentration range		s_R	CV_R
	13	1,836	5,926

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Ni Sample: 1

Unit: µg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		Lab.mean	V_i		
1	F19x	PD02	DB08	1,91	1,91	1,91	1,91	4	1,91		0,00	85,49
2	F12x	PC01	DB10	1,94	2,00	1,99	2,03	4	1,99		0,03	89,16
3	A47	PD01	DB10	2,06	1,93	2,09	2,07	4	2,04		0,07	91,20
4	F16x	PC01	DB10	2,04	2,04	2,02	2,06	4	2,04		0,02	91,31
5	F05	PD02	DB08	2,11	2,10	2,07	2,09	4	2,09		0,02	93,66
6	F06	PD02	DB08	2,06	2,15	2,15	2,08	4	2,11		0,05	94,44
7	F02x	PC02	DB08	2,06	2,18	2,12	2,08	4	2,11		0,05	94,44
8	A51	PD02	DB08	2,14	2,16	2,17	2,17	4	2,16		0,01	96,68
9	A82	PD01	DB10	2,17	2,18	2,16	2,15	4	2,16		0,01	96,78
10	A36	PD02	DB10	2,11	2,13	2,27	2,21	4	2,18		0,07	97,46
11	F14x	PC01	DB10	2,19	2,24	2,15	2,20	4	2,20		0,04	98,25
12	A60x	PD01	DB10	2,28	2,16	2,35	2,29	4	2,27		0,08	101,60
13	F08	PD01	DB10	2,05	2,17	2,77	2,17	4	2,29		0,33	102,37
14	F13x	PD01	DB10	2,11	2,36	2,32	2,40	4	2,30		0,13	102,84
15	F18x	PD99	DB10	2,28	2,35	2,32	2,36	4	2,33		0,04	104,18
16	F03x	PD02	DB08	2,35	2,32	2,33	2,45	4	2,36		0,06	105,67
17	F25	PB06	DB08	2,40	2,41	2,38	2,38	4	2,39		0,02	107,09
18	A65	PD01	DB08	2,40	2,40	2,40	2,40	4	2,40		0,00	107,42
19	F32	PD01	DB10	2,43	2,43	2,48	2,48	4	2,46		0,03	109,89
20	A80	PD01	DB10	2,49	2,49	2,47	2,50	4	2,49		0,01	111,34
21	F33	PD01	DB10	2,61	2,66	2,73	2,61	4	2,65		0,06	118,73
22	F24x	PD01	DB99	2,10	4,01	2,02	3,04	0	2,79	b *	0,93	33,46
23	F27	PD01	DB05	3,20	3,26	3,12	3,13	0	3,18	b *	0,07	2,10
24	A88	PD01	DB08	5,08	6,12	4,04	5,08	0	5,08	b *	0,85	16,72
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* = non tolerable mean because more than +/-

n Mean S_r CV_r
 all labs 84 2,23 0,053 2,393
 20 % from the mean

I S_R CV_R
 21 0,184 8,252

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Ni Sample: 2

Unit: µg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		Lab.mean	V_i		
1	F19x	PD02	DB08	4,08	4,08	4,08	4,08	4	4,08		0,00	86,91
2	F12x	PC01	DB10	4,36	4,36	4,27	4,25	4	4,31		0,06	91,82
3	A88	PD01	DB08	4,31	4,10	4,53	4,31	4	4,31		0,18	91,86
4	A36	PD02	DB10	4,37	4,34	4,35	4,41	4	4,37		0,03	93,00
5	A60x	PD01	DB10	4,54	4,46	4,30	4,28	4	4,39		0,13	93,58
6	A82	PD01	DB10	4,41	4,36	4,36	4,46	4	4,40		0,05	93,63
7	A47	PD01	DB10	4,64	4,43	4,59	4,33	4	4,50		0,14	95,80
8	F03x	PD02	DB08	4,45	4,47	4,67	4,48	4	4,51		0,10	96,15
9	F06	PD02	DB08	4,60	4,56	4,42	4,50	4	4,52		0,08	96,28
10	F14x	PC01	DB10	4,50	4,59	4,48	4,52	4	4,52		0,05	96,33
11	A51	PD02	DB08	4,57	4,64	4,65	4,63	4	4,62		0,04	98,46
12	F13x	PD01	DB10	4,51	4,70	4,66	4,96	4	4,71		0,19	100,27
13	F02x	PC02	DB08	4,27	4,92	4,40	5,39	4	4,75		0,51	101,07
14	F18x	PD99	DB10	4,85	4,81	4,87	4,89	4	4,86		0,03	103,41
15	F16x	PC01	DB10	4,88	5,04	4,82	4,95	4	4,92		0,10	104,90
16	F08	PD01	DB10	5,01	5,07	4,53	5,20	4	4,95		0,29	105,45
17	F05	PD02	DB08	4,87	4,95	4,87	5,16	4	4,96		0,14	105,70
18	A65	PD01	DB08	5,9a	5,20	5,00	5,00	3	5,07		0,12	107,92
19	F25	PB06	DB08	5,01	4,99	5,23	5,04	4	5,07		0,11	107,94
20	A80	PD01	DB10	4,90	5,04	5,28	5,08	4	5,08		0,16	108,10
21	F32	PD01	DB10	5,17	5,20	5,10	5,03	4	5,13		0,08	109,17
22	F33	PD01	DB10	5,25	5,21	5,42	5,57	4	5,36		0,17	114,22
23	F24x	PD01	DB99	4,57	6,32	5,71	5,35	0	5,49	c	0,73	116,89
24	F27	PD01	DB05	6,49	7,49	7,04	6,49	0	6,88	b *	0,48	146,48
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n Mean S_r CV_r
 all labs 87 4,69 0,124 2,650

* = non tolerable mean because more than +/-

20 % from the mean

I S_R CV_R
 22 0,336 7,146

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Ni Sample: 3

Unit: µg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		s_i	V_i		
1	F12x	PC01	DB10	2,83	2,85	2,87	2,673a	3	2,85		0,02	87,94
2	A88	PD01	DB08	2,85	3,34	2,36	2,85	4	2,85		0,40	87,97
3	F05	PD02	DB08	2,92	2,92	2,81	2,89	4	2,89		0,05	89,05
4	A47	PD01	DB10	2,90	2,95	2,85	2,86	4	2,89		0,05	89,20
5	A36	PD02	DB10	3,04	3,16	2,98	3,08	4	3,06		0,07	94,49
6	A82	PD01	DB10	3,06	3,15	3,00	3,05	4	3,07		0,07	94,60
7	A60x	PD01	DB10	3,17	3,08	2,99	3,10	4	3,08		0,07	95,18
8	F03x	PD02	DB08	3,09	3,16	2,96	3,18	4	3,10		0,10	95,64
9	F14x	PC01	DB10	3,18	3,15	3,11	3,07	4	3,13		0,05	96,53
10	F08	PD01	DB10	3,05	3,10	3,25	3,15	4	3,14		0,08	96,77
11	F13x	PD01	DB10	2,90	3,26	3,21	3,31	4	3,17		0,18	97,84
12	F19x	PD02	DB08	3,18	3,18	3,18	3,18	4	3,18		0,00	98,15
13	F02x	PC02	DB08	3,03	3,03	3,42	3,51	4	3,25		0,25	100,24
14	A51	PD02	DB08	3,29	3,25	3,16	3,32	4	3,26		0,07	100,47
15	F32	PD01	DB10	3,19	3,32	3,35	3,32	4	3,30		0,07	101,70
16	F18x	PD99	DB10	3,40	3,37	3,34	3,39	4	3,38		0,03	104,17
17	F06	PD02	DB08	3,37	3,35	3,39	3,43	4	3,39		0,03	104,48
18	F25	PB06	DB08	3,67	3,54	3,65	3,51	4	3,59		0,08	110,88
19	A80	PD01	DB10	3,62	3,57	3,59	3,79	4	3,64		0,10	112,43
20	F16x	PC01	DB10	3,70	3,67	3,62	3,62	4	3,65		0,04	112,78
21	A65	PD01	DB08	3,80	3,50	3,70	3,70	4	3,68		0,13	113,43
22	F33	PD01	DB10	3,78	3,77	4,36a	3,86	3	3,80	c *	0,05	117,39
23	F24x	PD01	DB99	3,80	4,96	3,30	3,50	0	3,89	b *	0,74	120,07
24	F27	PD01	DB05	4,48	5,61	5,43	5,24	0	5,19	b *	0,50	160,17
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* = non tolerable mean because more than +/-

n Mean s_r CV_r
 all labs 86 3,24 0,091 2,803
 20 % from the mean

I s_R CV_R
 22 0,284 8,775

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Element: Ni Sample: 4

Unit: µg/g

No.	Lab. Code	Method code		Replications				n	Lab.mean		Lab.standard dev. s_i	Recovery %
		P	D	1	2	3	4		s_i	V_i		
1	A47	PD01	DB10	0,58	0,57	0,60	0,68	4	0,61		0,05	8,22
2	F12x	PC01	DB10	0,68	0,68	0,67	0,66	4	0,67		0,01	1,11
3	A82	PD01	DB10	0,68	0,68	0,68	0,69	4	0,68		0,01	0,83
4	F19x	PD02	DB08	0,69	0,69	0,69	0,69	4	0,69		0,00	0,00
5	A60x	PD01	DB10	0,71	0,70	0,73	0,73	4	0,72		0,02	2,80
6	A36	PD02	DB10	0,75	0,72	0,70	0,73	4	0,72		0,02	3,26
7	A88	PD01	DB08	0,40	0,89	0,89	0,72	0	0,73	c	0,23	31,86
8	F02x	PC02	DB08	0,71	0,74	0,76	0,73	4	0,73		0,02	3,00
9	F16x	PC01	DB10	0,75	0,78	0,78	0,73	4	0,76		0,02	2,90
10	F06	PD02	DB08	0,77	0,72	0,78	0,78	4	0,76		0,03	3,77
11	F24x	PD01	DB99	0,86	0,72	0,90	0,59	4	0,77		0,14	18,41
12	F05	PD02	DB08	0,83	0,73	0,82	0,77	4	0,79		0,05	5,84
13	F33	PD01	DB10	0,89	0,74	0,79	0,81	4	0,81		0,06	7,73
14	F32	PD01	DB10	0,80	0,80	0,83	0,82	4	0,81		0,01	1,60
15	A51	PD02	DB08	0,78	0,91	0,78	0,79	4	0,82		0,06	7,79
16	F13x	PD01	DB10	0,72	0,86	0,82	0,87	4	0,82		0,07	8,65
17	F14x	PC01	DB10	0,82	0,85	0,83	0,83	4	0,83		0,01	1,54
18	F18x	PD99	DB10	0,85	0,82	0,81	0,85	4	0,83		0,02	2,50
19	F03x	PD02	DB08	0,90	0,92	0,87	0,88	4	0,89		0,03	2,85
20	A80	PD01	DB10	0,87	1,01	0,89	0,87	4	0,91		0,07	7,60
21	F25	PB06	DB08	0,98	0,94	0,97	1,02	4	0,98		0,03	3,37
22	F08	PD01	DB10	1,35	0,80	0,94	1,08	0	1,04	b *	0,24	22,80
23	F27	PD01	DB05	1,63	1,52	1,24	1,21	0	1,40	b *	0,21	14,72
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26	A65	PD01	DB08	<1,1	<1,1	<1,1	<1,1			**		
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n Mean S_r CV_r
 all labs 80 0,78 0,037 4,728

30 % from the mean

* = non tolerable mean because more than +/-

** = higher than maximum acceptable LOQ

Limit for the lower concentration range

| S_R CV_R
 20 0,088 11,283

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Additional parameters

Element	Unit	Sample no.	Lab no.	Method code		Replicates				Mean	Si	Vi
				P	D	1	2	3	4			
Ag	(ng/g)	1	A80	PC01	DB10	5,78	4,88	5,79	5,13	5,40	0,462	8,559
Ag	(ng/g)	2	A80	PC01	DB10	26	25,7	25,9	28	26,40	1,074	4,068
Ag	(ng/g)	3	A80	PC01	DB10	6,84	6,15	7,32	6,15	6,62	0,572	8,641
Ag	(ng/g)	4	A80	PC01	DB10	7,58	8,05	8,71	8,5	8,21	0,502	6,117
Al	(µg/g)	1	A51	PD02	DB08	66,1	69,4	72,2	70,3	69,50	2,550	3,668
Al		1	F24	PD01	DB99	68	98	48	66	70,00	20,720	29,601
Al		1	F19x	PD02	DB08	70,4	70,4	70,4	70,4	70,40	0,000	0,000
Al		1	F25	PB06	DB08	75,2	73,7	73,1	75,8	74,45	1,261	1,694
Al		1	F28x	PD02	DB08	77,25	78,19	76,65	80,02	78,03	1,472	1,886
Al		1	A60x	PC01	DB10	79,342	74,061	82,474	80,278	79,04	3,569	4,515
Al		1	A80	PC01	DB10	80	84,1	74,1	81,2	79,85	4,202	5,262
Al		1	A36	PD02	DB08	81,54	76,86	85,15	77,18	80,18	3,940	4,914
Al		1	F05	PD02	DB08	84,1	85,2	82,9	80,1	83,08	2,195	2,642
Al		1	F12x	PC01	DB08	83	82	88	83	84,00	2,708	3,224
Al		1	F18x	PD99	DB08	89	88,2	87,6	87,4	88,05	0,719	0,816
Al		1	A59	PC01	DB08	93,27	94,23	94,59	94,59	94,17	0,624	0,662
Al		1	F32	PD01	DB08	97,3	99,8	100,4	99,6	99,28	1,360	1,370
Al		1	A65	PD01	DB08	101	101	99	103	101,00	1,633	1,617
Al		1	F03	PD02	DB08	91,83	108,41	108,52	103,03	102,95	7,842	7,618
Al		1	F16x	PC01	DB08	110,9	106,1	102,2	100,8	105,00	4,528	4,312
Al		1	F15x	PD01	DB08	104,5	107,3	105,9	104,9	105,65	1,248	1,181
Al		1	F13x	PD01	DB08	111	107	110	110	109,50	1,732	1,582
Al		1	A45x	PB99	DB08	112	116	115	112	113,75	2,062	1,812
Al		1	A57	PZ02	DD02	162,9	170,8	161,5	163,2	164,60	4,199	2,551
Al	(µg/g)	2	F25	PB06	DB08	237,3	222,3	227,4	234,6	230,40	6,828	2,963
Al		2	A51	PD02	DB08	220	235	271	243	242,25	21,407	8,837
Al		2	F05	PD02	DB08	245	258	269	249	255,25	10,658	4,175
Al		2	A60x	PC01	DB10	248,44	289,44	222,19	270,08	257,54	28,910	11,225
Al		2	A80	PC01	DB10	222	273	264	297	264,00	31,273	11,846

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Additional parameters

Element	Unit	Sample no.	Lab no.	Method code		Replicates				Mean	Si	Vi
				P	D	1	2	3	4			
AI	(µg/g)	2	A36	PD02	DB08	249,97	276,68	285,23	282,02	273,48	16,062	5,873
AI		2	F18x	PD99	DB08	281	297	283	250	277,75	19,822	7,137
AI		2	F19x	PD02	DB08	279	279	279	279	279,00	0,000	0,000
AI		2	F28x	PD02	DB08	272,2	279,2	294,1	303,8	287,33	14,284	4,971
AI		2	F03	PD02	DB08	292,55	317,69	266,49	283,18	289,98	21,389	7,376
AI		2	F24	PD01	DB99	300	340	320	280	310,00	25,820	8,329
AI		2	A59	PC01	DB08	313,85	316,49	314,88	323,6	317,21	4,400	1,387
AI		2	A65	PD01	DB08	312	386	375	289	340,50	47,346	13,905
AI		2	F12x	PC01	DB08	354	350	352	350	351,50	1,915	0,545
AI		2	F13x	PD01	DB08	370	361	335	342	352,00	16,269	4,622
AI		2	F16x	PC01	DB08	352,6	356,5	358	361,5	357,15	3,686	1,032
AI		2	F15x	PD01	DB08	470,7	343,7	297,6	322,6	358,65	77,040	21,481
AI		2	A57	PZ02	DD02	365,5	345,1	345,1	381	359,18	17,441	4,856
AI		2	F32	PD01	DB08	389	355	386	355	371,25	18,804	5,065
AI		2	A45x	PB99	DB08	381	373	391	418	390,75	19,602	5,017
AI	(µg/g)	3	F19x	PD02	DB08	235	235	235	235	235,00	0,000	0,000
AI		3	A59	PC01	DB08	246,01	241,95	237,27	259,48	246,18	9,560	3,884
AI		3	F12x	PC01	DB08	259	259	266	240	256,00	11,165	4,361
AI		3	A36	PD02	DB08	257,74	255,62	247,17	277,81	259,59	12,980	5,000
AI		3	A60x	PC01	DB10	267,83	262,19	267,36	266,23	265,90	2,564	0,964
AI		3	A80	PC01	DB10	269	270	259	268	266,50	5,066	1,901
AI		3	F25	PB06	DB08	269	268,7	267,5	269,1	268,58	0,737	0,274
AI		3	F28x	PD02	DB08	268,8	278,5	272,8	261,9	270,50	6,979	2,580
AI		3	F03	PD02	DB08	274,21	275,93	276,52	266,28	273,24	4,739	1,734
AI		3	A57	PZ02	DD02	287,9	285,3	257,1	267	274,33	14,777	5,387
AI		3	A45x	PB99	DB08	283	276	282	265	276,50	8,266	2,990
AI		3	F18x	PD99	DB08	284	282	271	272	277,25	6,702	2,417
AI		3	F05	PD02	DB08	277	280	277	276	277,50	1,732	0,624
AI		3	F32	PD01	DB08	280	285	275	278	279,50	4,203	1,504

26th Needle/Leaf Interlaboratory Comparison Test 2023/2024

Additional parameters

Element	Unit	Sample no.	Lab no.	Method code		Replicates				Mean	Si	Vi
				P	D	1	2	3	4			
Al	(µg/g)	3	F16x	PC01	DB08	275,3	283,9	277,7	283,6	280,13	4,301	1,535
Al		3	A65	PD01	DB08	290	286	279	281	284,00	4,967	1,749
Al		3	F13x	PD01	DB08	283	286	291	298	289,50	6,557	2,265
Al		3	F15x	PD01	DB08	291,3	368,5	281,8	279,4	305,25	42,479	13,916
Al		3	A51	PD02	DB08	312	318	319	303	313,00	7,348	2,348
Al		3	F24	PD01	DB99	340	340	320	335,00	10,000	2,985	
Al	(µg/g)	4	F19x	PD02	DB08	95,6	95,6	95,6	95,6	95,60	0,000	0,000
Al		4	F25	PB06	DB08	104	102,4	104,1	103	103,38	0,818	0,791
Al		4	A51	PD02	DB08	104	105	102	104	103,75	1,258	1,213
Al		4	A80	PC01	DB10	112	99,4	111	100	105,60	6,829	6,467
Al		4	A60x	PC01	DB10	103,43	108,95	104,9	105,39	105,67	2,341	2,216
Al		4	A36	PD02	DB08	108,1	103,33	111,28	109,16	107,97	3,362	3,114
Al		4	F28x	PD02	DB08	113,1	110,9	109,7	108,8	110,63	1,861	1,682
Al		4	A59	PC01	DB08	112,19	110,56	111,66	111,43	111,46	0,679	0,609
Al		4	F12x	PC01	DB08	112	114	112	111	112,25	1,258	1,121
Al		4	F18x	PD99	DB08	114	113	115	115	114,25	0,957	0,838
Al		4	F32	PD01	DB08	117	116	117	115	116,25	0,957	0,824
Al		4	F24	PD01	DB99	110	130	120	110	117,50	9,574	8,148
Al		4	F05	PD02	DB08	116	120	115	120	117,75	2,630	2,234
Al		4	F16x	PC01	DB08	122,6	121,7	122,4	121,5	122,05	0,532	0,436
Al		4	A65	PD01	DB08	120	126	124	126	124,00	2,828	2,281
Al		4	F03	PD02	DB08	123,84	119,15	133,23	121,35	124,39	6,195	4,980
Al		4	F15x	PD01	DB08	125,2	125,5	128,8	124,8	126,08	1,839	1,459
Al		4	F13x	PD01	DB08	132	130	129	129	130,00	1,414	1,088
Al		4	A45x	PB99	DB08	135	136	134	132	134,25	1,708	1,272
Al		4	A57	PZ02	DD02	154,7	155,9	157,1	156	155,93	0,981	0,629
Ba	(µg/g)	1	F16x	PC01	DB10	8,188	8,432	8,099	8,341	8,27	0,150	1,810
Ba		1	A82	PD01	DB08	8,696	8,685	8,692	8,73	8,70	0,020	0,230
Ba		1	A65	PD01	DB08	9	9,8	9,2	9,9	9,48	0,443	4,671

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Additional parameters

Element	Unit	Sample no.	Lab no.	Method code		Replicates				Mean	Si	Vi
				P	D	1	2	3	4			
Ba	(µg/g)	1	A80	PD01	DB10	10,22	10,13	10,17	10,19	10,18	0,038	0,371
Ba	(µg/g)	2	F16x	PC01	DB10	64,59	65,92	64,26	65,58	65,09	0,789	1,212
Ba		2	A82	PD01	DB08	65,84	65,37	65,23	65,94	65,60	0,348	0,530
Ba		2	A65	PD01	DB08	72,6	74,2	71,8	68,5	71,78	2,401	3,345
Ba		2	A80	PD01	DB10	75,3	76,4	77,3	79,5	77,13	1,782	2,311
Ba	(µg/g)	3	A82	PD01	DB08	2,02	2,047	2,062	1,954	2,02	0,048	2,364
Ba		3	F16x	PC01	DB10	2,082	2,101	2,251	2,254	2,17	0,093	4,295
Ba		3	A65	PD01	DB08	2,4	2,3	2,2	2,3	2,30	0,082	3,550
Ba		3	A80	PD01	DB10	2,48	2,27	2,34	2,4	2,37	0,089	3,760
Ba	(µg/g)	4	F16x	PC01	DB10	19,84	19,83	20,59	20,23	20,12	0,363	1,804
Ba		4	A82	PD01	DB08	20,88	20,29	20,48	20,27	20,48	0,283	1,382
Ba		4	A65	PD01	DB08	21,6	22,1	22,1	21,4	21,80	0,356	1,633
Ba		4	A80	PD01	DB10	25,2	24,6	25	25,3	25,03	0,310	1,237
Be	(ng/g)	1	F16x	PC01	DB10	3,363	3,346	3,013	2,999	3,18	0,201	6,333
Be		1	A80	PC01	DB10	14	18	13,4	12,7	14,53	2,377	16,363
Be	(ng/g)	2	F16x	PC01	DB10	19,43	20,77	18,33	19,76	19,57	1,006	5,137
Be		2	A80	PC01	DB10	28,7	25,2	29,2	29,4	28,13	1,972	7,012
Be	(ng/g)	3	F16x	PC01	DB10	2,888	2,609	3,12	2,616	2,81	0,245	8,728
Be		3	A80	PC01	DB10	15	16,2	12,8	10,2	13,55	2,640	19,484
Be	(ng/g)	4	F16x	PC01	DB10	137,9	143,5	136,7	142,2	140,08	3,285	2,345
Be		4	A80	PC01	DB10	155	153	151	155	153,50	1,915	1,247
Bi	(ng/g)	1	F16x	PC01	DB10	11,64	8,626	12,27	9,102	10,41	1,813	17,421
Bi		1	A80	PC01	DB10	12,3	13,7	13,2	13,4	13,15	0,603	4,584
Bi	(ng/g)	2	F16x	PC01	DB10	11,82	12,41	12,59	11,27	12,02	0,600	4,989
Bi		2	A80	PC01	DB10	16,1	12,9	17,1	16,5	15,65	1,879	12,005
Bi	(ng/g)	3	F16x	PC01	DB10	0,763	0,7683	0,9109	0,863	0,83	0,073	8,804
Bi		3	A80	PC01	DB10	1,16	1,39	0,961	1,17	1,17	0,175	14,979
Bi	(ng/g)	4	F16x	PC01	DB10	8,384	7,155	8,421	7,538	7,87	0,630	7,995
Bi		4	A80	PC01	DB10	17,5	9,77	11,1	11,2	12,39	3,467	27,975

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Additional parameters

Element	Unit	Sample no.	Lab no.	Method code		Replicates			Mean	Si	Vi
				P	D	1	2	3			
Ce	(ng/g)	1	A80	PC01	DB10	118	128	112	103	115,25	10,500
Ce	(ng/g)	2	A80	PC01	DB10	481	571	554	610	554,00	54,019
Ce	(ng/g)	3	A80	PC01	DB10	20	12	16,9	18,3	16,80	3,442
Ce	(ng/g)	4	A80	PC01	DB10	118	109	126	123	119,00	7,439
Cl	(μg/g)	1	A57	PZ02	DD02	1460	1450	1430	1480	1455,00	20,817
Cl	(μg/g)	1	F02	PA06	DF08	1600	1580	1560	1570	1577,50	17,078
Cl	(μg/g)	2	F02	PA06	DF08	260	130	120	110	155,00	45,467
Cl	(μg/g)	2	A57	PZ02	DD02	360	350	380	370	365,00	12,910
Cl	(μg/g)	3	F02	PA06	DF08	140	170	<100	150		1,083
Cl	(μg/g)	3	A57	PZ02	DD02	290	290	290	300	292,50	5,000
Cl	(μg/g)	4	F02	PA06	DF08	<100	<100	100	<100		3,537
Cl	(μg/g)	4	A57	PZ02	DD02	160	160	170	160	162,50	5,000
Cs	(ng/g)	1	A80	PC01	DB10	10,64	11,6	10,8	11,6	11,16	0,512
Cs	(ng/g)	2	A80	PC01	DB10	109	113	123	123	117,00	7,118
Cs	(ng/g)	3	A80	PC01	DB10	277	272	273	280	275,50	3,697
Cs	(ng/g)	4	A80	PC01	DB10	30,1	28,4	30,3	29,6	29,60	0,852
F	(μg/g)	1	F02	PE01	DF03	3,3	3,4	<3	<3		6,084
F	(μg/g)	1	F32x	PE99	DF03	4,54	4,4	3,73	3,82	4,12	0,407
F	(μg/g)	2	F02	PE01	DF03	3,8	4,4	4	3,9	4,03	1,342
F	(μg/g)	2	F32x	PE99	DF03	8,63	8,98	7,81	8,75	8,54	2,880
F	(μg/g)	3	F02	PE01	DF03	<3	<3	<3	<3		6,590
F	(μg/g)	3	F32x	PE99	DF03	3,91	3,81	3,98	3,73	3,86	2,851
F	(μg/g)	4	F02	PE01	DF03	<3	<3	<3	<3		10,435
F	(μg/g)	4	F32x	PE99	DF03	5,16	4,89	6,08	5,91	5,51	
La	(ng/g)	1	A80	PC01	DB10	68	68,7	60,9	55,2	63,20	6,392
La	(ng/g)	2	A80	PC01	DB10	449	496	568	514	506,75	49,176
La	(ng/g)	3	A80	PC01	DB10	14,1	9,91	12	13,6	12,40	1,888
La	(ng/g)	4	A80	PC01	DB10	65,6	58,8	69,2	67,8	65,35	4,611
Li	(μg/g)	1	A80	PD01	DB10	0,254	0,252	0,249	0,25	0,002	0,857

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Additional parameters

Element	Unit	Sample no.	Lab no.	Method code		Replicates				Mean	Si	Vi
				P	D	1	2	3	4			
Li	(µg/g)	2	A80	PD01	DB10	0,227	0,273	0,339	0,302	0,29	0,047	16,583
Li	(µg/g)	3	A80	PD01	DB10	0,0212	0,0202	0,0258	0,0197	0,02	0,003	12,830
Li	(µg/g)	4	A80	PD01	DB10	0,125	0,119	0,119	0,118	0,12	0,003	2,662
Mo	(ng/g)	1	F13x	PD01	DB10	445	499	505	487,00	28,142	5,779	
Mo	(ng/g)	1	A36	PD02	DB10	482,1	493,5	494,5	491,8	490,48	5,693	1,161
Mo		1	F16x	PC01	DB10	505	496	509,6	496,2	501,70	6,734	1,342
Mo		1	F32	PD01	DB10	520	507	511	527	516,25	8,995	1,742
Mo	(ng/g)	1	A80	PD01	DB10	541	544	536	550	542,75	5,852	1,078
Mo	(ng/g)	2	F32	PD01	DB10	85,1	83,8	84,8	90,7	86,10	3,117	3,620
Mo		2	A36	PD02	DB10	91,34	90,91	91,44	91,55	91,31	0,280	0,307
Mo		2	F13x	PD01	DB10	90	92	89	104	93,75	6,946	7,409
Mo		2	A80	PD01	DB10	100,2	102,5	113	105	105,18	5,573	5,299
Mo		2	F16x	PC01	DB10	117,3	118,2	118,9	125,5	119,98	3,741	3,118
Mo	(ng/g)	3	F32	PD01	DB10	<10	<10	<10	<10	<10		
Mo		3	F13x	PD01	DB10	16	18	17	18	17,25	0,957	5,550
Mo		3	A36	PD02	DB10	17,64	17,96	18,7	16,8	17,78	0,787	4,428
Mo		3	A80	PD01	DB10	25,7	26,2	35,7	29,2	29,20	4,601	15,756
Mo		3	F16x	PC01	DB10	35,33	32,84	35,33	35,03	34,63	1,203	3,475
Mo	(ng/g)	4	F32	PD01	DB10	65,9	70,4	64,6	66,6	66,88	2,492	3,726
Mo		4	F13x	PD01	DB10	65	66	67	72	67,50	3,109	4,606
Mo		4	F16x	PC01	DB10	67,12	70,51	72,03	69,18	69,71	2,083	2,987
Mo		4	A36	PD02	DB10	70,79	72,7	74,71	69,31	71,88	2,343	3,260
Mo		4	A80	PD01	DB10	88,2	93,1	91,7	88,4	90,35	2,437	2,697
Na	(µg/g)	1	F15x	PC01	DB08	<20	<20	<20	<20	<20		
Na		1	F12x	PC01	DB08	<5	<5	<5	<5	<5		
Na		1	F32x	PD01	DB08	5,07	4,86	4,86	4,76	4,89	0,130	2,670
Na		1	A36	PD02	DB08	8,88	7,74	8,31	9,09	8,51	0,607	7,139
Na		1	A60x	PD01	DB10	8,5983	6,42	9,9551	10,133	8,78	1,714	19,530
Na		1	F16x	PC01	DB10	9,791	10,04	9,724	9,867	9,867	0,136	1,382

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Additional parameters

Element	Unit	Sample no.	Lab no.	Method code		Replicates			Mean	Si	Vi
				P	D	1	2	3			
Na	(µg/g)	1	F14x	PC01	DB08	10,5	10,2	10,4	10,3	0,129	1,247
Na		1	F19x	PD02	DB08	10,5	10,5	10,5	10,5	0,000	0,000
Na		1	F18x	PD99	DB08	12,4	10,6	10,9	10,3	11,05	8,441
Na		1	F05	PD02	DB08	10,5	11,2	12,6	12,7	1,079	9,179
Na		1	A51	PD02	DB08	10,4	10,5	15,9	13,9	12,68	2,696
Na		1	F25	PB06	DB08	17,33	15,51	16,66	16,5	16,50	0,752
Na		1	F03x	PD02	DB08	17,624	18,487	16,877	17,126	17,53	4,555
Na		1	F13x	PD01	DB08	19,1	18,1	17,9	16,5	17,90	0,710
Na		1	F24	PD01	DB99	18	15	11	34	19,50	5,982
Na		1	F28x	PD02	DB08	21,26	20,51	19,51	20,06	20,34	51,708
Na		1	A65	PD01	DB08	21,3	23	20,2	20,1	21,15	3,639
Na											6,373
Na	(µg/g)	2	F15x	PC01	DB08	28	21	<20	20		
Na		2	F12x	PC01	DB08	22	26	19	18	21,25	3,594
Na		2	A60x	PD01	DB10	21,651	24,354	19,984	22,296	22,07	16,913
Na		2	F25	PB06	DB08	25,29	25,75	24,82	25,29	25,29	8,187
Na		2	F32x	PD01	DB08	26,5	26,3	25,2	25,2	25,80	1,501
Na		2	F18x	PD99	DB08	26	26,1	26,6	26,7	26,35	2,704
Na		2	A51	PD02	DB08	24,7	21,1	30	29,8	0,351	1,333
Na		2	A36	PD02	DB08	27,35	25,53	27,67	26,71	26,82	16,292
Na		2	F16x	PC01	DB10	28,53	28,02	29,01	28,44	28,50	3,524
Na		2	F19x	PD02	DB08	29,3	29,3	29,3	29,3	29,30	1,425
Na		2	F05	PD02	DB08	29,8	28,9	29,8	28,9	0,000	0,000
Na		2	F14x	PC01	DB08	34,2	33,9	32,9	33,7	33,68	0,556
Na		2	A65	PD01	DB08	35,4	38,4	36	34,9	36,18	1,651
Na		2	F03x	PD02	DB08	39,569	37,481	32,024	35,959	36,26	4,285
Na		2	F24	PD01	DB99	40	43	47	24	38,50	8,790
Na		2	F13x	PD01	DB08	42	39,5	40,1	39,6	40,30	26,190
Na		2	F28x	PD02	DB08	41,71	41,49	40,97	38,71	40,72	2,887
Na	(µg/g)	3	F15x	PC01	DB08	<20	<20	<20	<20	<20	3,378

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Additional parameters

Element	Unit	Sample no.	Lab no.	Method code		Replicates				Mean	Si	Vi
				P	D	1	2	3	4			
Na	(µg/g)	3	F18x	PD99	DB08	<10	<10	<10	<10	<11,1	<11,1	25,176
Na		3	A65	PD01	DB08	12,9	<11,1	<11,1	<10	<11,1	<11,1	5,31
Na		3	F12x	PC01	DB08	<5	<5	<5	<5	4,96	5,70	0,300
Na		3	F32x	PD01	DB08	7,27	4,7	4,3	4,96	5,97	5,70	5,269
Na		3	A36	PD02	DB08	5,88	5,3	5,63	5,97	6,29	7,18	8,806
Na		3	F25	PB06	DB08	7,7	7,18	7,55	7,55	8,1	8,1	0,632
Na		3	F19x	PD02	DB08	8,1	8,1	8,1	8,1	8,10	8,10	0,000
Na		3	F14x	PC01	DB08	9,3	8,4	8	8,5	8,5	8,5	0,545
Na		3	F05	PD02	DB08	10,7	12,7	9,69	12,4	11,37	11,37	12,540
Na		3	F13x	PD01	DB08	10,7	12,2	12,8	11,6	11,83	11,83	7,576
Na		3	F16x	PC01	DB10	12,73	13,54	12,45	13,19	12,98	12,98	3,725
Na		3	F03x	PD02	DB08	15,77	17,398	14,96	14,43	15,64	15,64	8,283
Na		3	A51	PD02	DB08	16,6	10,9	16,8	22,6	16,73	16,73	28,564
Na		3	F28x	PD02	DB08	22,9	23,77	23,2	24,04	23,48	23,48	2,217
Na		3	F24	PD01	DB99	25	23	19	28	23,75	23,75	15,894
Na		3	A60x	PD01	DB10	96,516	4,659	4,5372	3,0859	27,20	27,20	46,217
Na	(µg/g)	4	F15x	PC01	DB08	<20	<20	<20	<20	<20	<20	169,917
Na		4	F12x	PC01	DB08	12	11	13	14	14	12,50	1,291
Na		4	A60x	PD01	DB10	12,508	15,022	13,548	13,728	13,70	13,70	7,529
Na		4	F32x	PD01	DB08	14,4	14,3	14,1	14,4	14,30	14,30	0,141
Na		4	A36	PD02	DB08	18,33	16,85	18,02	18,12	17,83	17,83	0,666
Na		4	A51	PD02	DB08	20,1	16,8	19,2	17,4	18,38	18,38	1,537
Na		4	F16x	PC01	DB10	19,35	19,21	18,86	19,04	19,12	19,12	0,212
Na		4	F18x	PD99	DB08	19,2	19,3	19,1	19,3	19,23	19,23	0,096
Na		4	F19x	PD02	DB08	19,5	19,5	19,5	19,5	19,5	19,5	0,498
Na		4	F05	PD02	DB08	17,2	22	19	21	19,80	19,80	0,000
Na		4	F25	PB06	DB08	18,76	18,73	20,59	21,25	19,83	19,83	10,785
Na		4	F14x	PC01	DB08	21,4	20,6	20,7	20,4	20,78	20,78	6,476
Na		4	A65	PD01	DB08	22	22,5	22,3	21,6	22,10	22,10	2,094

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Additional parameters

Element	Unit	Sample no.	Lab no.	Method code		Replicates				Mean	Si	Vi
				P	D	1	2	3	4			
Na	(µg/g)	4	F24	PD01	DB99	23	37	26	11	24,25	10,689	44,077
Na		4	F28x	PD02	DB08	27,65	25,72	26,36	26,56	26,57	0,803	3,021
Na		4	F03x	PD02	DB08	29,851	28,646	25,087	24,63	27,05	2,589	9,568
Na		4	F13x	PD01	DB08	27,2	28,3	28	28,9	28,10	0,707	2,516
Nb	(ng/g)	1	A80	PD01	DB10	15,2	15,3	13	15	14,63	1,090	7,456
Nb	(ng/g)	2	A80	PD01	DB10	22,5	27,2	31,3	30,4	27,85	3,977	14,280
Nb	(ng/g)	3	A80	PD01	DB10	1,32	1,38	1,44	2,2	1,59	0,413	26,052
Nb	(ng/g)	4	A80	PD01	DB10	12,9	9,53	13,1	11,4	11,73	1,653	14,087
Rb	(µg/g)	1	F16x	PC01	DB10	7,279	7,319	7,374	7,129	7,28	0,105	1,443
Rb		1	A80	PD01	DB10	8,8	8,84	8,76	8,81	8,80	0,033	0,375
Rb	(µg/g)	2	F16x	PC01	DB10	9,307	8,953	9,295	8,971	9,13	0,196	2,146
Rb		2	A80	PD01	DB10	10,33	10,2	10,45	11,1	10,52	0,400	3,801
Rb	(µg/g)	3	F16x	PC01	DB10	52,38	53,15	54,56	52,57	53,17	0,986	1,855
Rb		3	A80	PD01	DB10	65,2	64,9	65,3	65,7	65,28	0,330	0,506
Rb	(µg/g)	4	F16x	PC01	DB10	59,05	56,82	57,41	58,24	57,88	0,973	1,682
Rb		4	A80	PD01	DB10	73,4	72,7	72,9	71,7	72,68	0,714	0,982
Sb	(ng/g)	1	F16x	PC01	DB10	53,66	51,58	49,79	50,04	51,27	1,781	3,473
Sb		1	A82	PD01	DB10	61,22	60,19	56,81	58,76	59,25	1,911	3,226
Sb		1	A80	PD01	DB10	69,3	73	73,4	70,1	71,45	2,053	2,874
Sb		1	F32	PD01	DB10	78,4	79,3	80,3	82,9	80,23	1,945	2,424
Sb	(ng/g)	2	F16x	PC01	DB10	1461	1538	1462	1476	1484,25	36,482	2,458
Sb		2	A82	PD01	DB10	1452	1487	1584	1415	1484,50	72,556	4,888
Sb		2	F32	PD01	DB10	1634	1600	1545	1645	1606,00	44,952	2,799
Sb		2	A80	PD01	DB10	2100	2150	2120	2180	2137,50	35,000	1,637
Sb	(ng/g)	3	F32	PD01	DB10	5,79	7,73	<5	<5			
Sb		3	A80	PD01	DB10	3,06	2,16	2,19	2,37			
Sb		3	A82	PD01	DB10	3,292	3,62	3,091	3,687			
Sb		3	F16x	PC01	DB10	3,375	3,629	3,858	3,216			
Sb	(ng/g)	4	A82	PD01	DB10	13,38	12,91	12,53	13,02	12,96	0,350	2,700

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Additional parameters

Element	Unit	Sample no.	Lab no.	Method code		Replicates				Mean	Si	Vi
				P	D	1	2	3	4			
Sb	(ng/g)	4	F16x	PC01	DB10	12,27	12,67	13,89	13,84	13,17	0,822	6,243
Sb		4	F32	PD01	DB10	16,1	18	15,1	15,8	16,25	1,240	7,628
Sb		4	A80	PD01	DB10	25	27,3	26	25	25,83	1,090	4,223
Se	(ng/g)	1	A82	PD01	DB10	473,1	473,1	470,4	481,3	474,48	4,725	0,996
Se		1	F32	PD01	DB04	576	577	572	580	576,25	3,304	0,573
Se		1	A80	PD01	DB10	626	650	631	630	634,25	10,720	1,690
Se		1	A36	PD02	DB10	620,28	595,62	685,23	654,73	638,97	39,230	6,140
Se		1	F16x	PC01	DB10	710	712,1	698,2	710,4	707,68	6,382	0,902
Se	(ng/g)	2	F32	PD01	DB04	34	35	36	36	35,25	0,957	2,716
Se		2	A82	PD01	DB10	39,64	40,28	39,32	38,32	39,39	0,817	2,075
Se		2	A36	PD02	DB10	50,21	54,16	54,8	52,34	52,88	2,061	3,898
Se		2	F16x	PC01	DB10	77,91	86,59	67,47	83,26	78,81	8,361	10,610
Se		2	A80	PD01	DB10	107	120	100,8	61,6	97,35	25,140	25,825
Se	(ng/g)	3	F32	PD01	DB04	32	33	32	37	33,50	2,380	7,106
Se		3	A82	PD01	DB10	39,3	37,95	38,18	38,12	38,39	0,616	1,605
Se		3	A80	PD01	DB10	48,5	62,7	47,4	32,2	47,70	12,463	26,128
Se		3	A36	PD02	DB10	47,32	49,86	52,71	50,39	50,07	2,212	4,418
Se		3	F16x	PC01	DB10	61,03	47,17	54,24	53,15	53,90	5,681	10,540
Se	(ng/g)	4	F32	PD01	DB04	<30	<30	<30	<30	<30		
Se		4	A82	PD01	DB10	19,95	19,96	20,01	20,3	20,06	0,165	0,825
Se		4	A36	PD02	DB10	25,86	29,04	30,42	27,24	28,14	2,001	7,112
Se		4	A80	PD01	DB10	37,1	55,3	53,3	67,1	53,20	12,340	23,196
Se		4	F16x	PC01	DB10	78,03	84,94	91,28	99,06	88,33	8,971	10,156
Si	(µg/g)	1	F13	PZ98	DD01	3990	3900	3900	3910	3925,00	43,589	1,111
Si	(µg/g)	2	F13	PZ98	DD01	8980	8940	9080	9270	9067,50	147,281	1,624
Si	(µg/g)	3	F13	PZ98	DD01	84,3	84,6	85,7	84,3	84,73	0,665	0,785
Si	(µg/g)	4	F13	PZ98	DD01	8560	8570	8600	8710	8610,00	68,799	0,799
Sn	(ng/g)	1	A80	PD01	DB10	173	202	185	177	184,25	12,842	6,970
Sn		1	F16x	PC01	DB10	210	208,2	158,3	172,4	187,23	25,917	13,843

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Additional parameters

Element	Unit	Sample no.	Lab no.	Method code		Replicates				Mean	Si	Vi
				P	D	1	2	3	4			
Sn	(ng/g)	2	F16x	PC01	DB10	84,23	91,51	81,95	85,16	85,71	4,094	4,776
Sn	(ng/g)	2	A80	PD01	DB10	85,6	94,2	95	100,9	93,93	6,303	6,711
Sn	(ng/g)	3	A80	PD01	DB10	7,67	9,08	7,52	7,37	7,91	0,790	9,982
Sn	(ng/g)	3	F16x	PC01	DB10	15,39	21,41	21,05	15,84	18,42	3,250	17,643
Sn	(ng/g)	4	F16x	PC01	DB10	55,56	54,97	50,67	61,79	55,75	4,580	8,216
Sn	(ng/g)	4	A80	PD01	DB10	78,3	72,3	65,9	81,1	74,40	6,752	9,075
Sr	(µg/g)	1	F16x	PC01	DB10	33,98	33,72	33,35	33,54	33,65	0,268	0,797
Sr	(µg/g)	1	A65	PD01	DB08	35	37,1	36,2	35,3	35,90	0,949	2,643
Sr	(µg/g)	1	F32	PD01	DB08	36,9	36,4	36,5	36,1	36,48	0,330	0,906
Sr	(µg/g)	1	A60x	PD01	DB10	37,68	36,649	36,316	37,967	37,15	0,795	2,139
Sr	(µg/g)	1	A80	PD01	DB10	40,1	39,4	39,6	40	39,78	0,330	0,831
Sr	(µg/g)	2	F16x	PC01	DB10	29,97	30,8	30,17	30,48	30,36	0,363	1,197
Sr	(µg/g)	2	A65	PD01	DB08	31,1	32,8	30,9	31,6	31,60	0,852	2,698
Sr	(µg/g)	2	A60x	PD01	DB10	32,92	32,357	31,995	33,929	32,80	0,843	2,571
Sr	(µg/g)	2	F32	PD01	DB08	33,1	33	33,7	33,4	33,30	0,316	0,950
Sr	(µg/g)	2	A80	PD01	DB10	33,6	33,1	34	35,2	33,98	0,896	2,637
Sr	(µg/g)	3	F16x	PC01	DB10	2,035	2,009	1,983	1,987	2,00	0,024	1,193
Sr	(µg/g)	3	A80	PD01	DB10	2,2	2,12	2,16	2,12	2,15	0,038	1,781
Sr	(µg/g)	3	A65	PD01	DB08	2,2	2,2	2,2	2,1	2,18	0,050	2,299
Sr	(µg/g)	3	F32	PD01	DB08	2,21	2,17	2,14	2,18	2,18	0,029	1,327
Sr	(µg/g)	3	A60x	PD01	DB10	3,5994	3,5924	3,6029	3,6064	3,60	0,006	0,166
Sr	(µg/g)	4	F16x	PC01	DB10	19,74	20,7	19,73	20,66	20,21	0,546	2,701
Sr	(µg/g)	4	A65	PD01	DB08	21,2	21,1	21,4	20,6	21,08	0,340	1,615
Sr	(µg/g)	4	A60x	PD01	DB10	22,521	22,074	22,487	22,046	22,28	0,257	1,153
Sr	(µg/g)	4	F32	PD01	DB08	22,3	22,5	22,5	22,2	22,38	0,150	0,670
Sr	(µg/g)	4	A80	PD01	DB10	24	24	23,7	23,8	23,88	0,150	0,628
Ti	(µg/g)	1	A80	PD01	DB10	3,44	3,65	2,79	3,7	3,40	0,419	12,335
Ti	(µg/g)	1	A65	PD01	DB08	5,4	5,5	5,4	5,7	5,50	0,141	2,571
Ti	(µg/g)	2	A80	PD01	DB10	7,93	9,87	11,9	11,2	10,23	1,746	17,079

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Additional parameters

Element	Unit	Sample no.	Lab no.	Method code		Replicates				Mean	Si	Vi
				P	D	1	2	3	4			
Ti	(µg/g)	2	A65	PD01	DB08	12,1	13	12,7	10,8	12,15	0,975	8,022
Ti	(µg/g)	3	A65	PD01	DB08	1,3	2,1	<1,1	<1,1			
Ti	(µg/g)	3	A80	PD01	DB10	0,769	0,646	0,742	0,824	0,75	0,074	9,989
Ti	(µg/g)	4	A80	PD01	DB10	3,02	2,17	3	2,17	2,59	0,485	18,728
Ti	(µg/g)	4	A65	PD01	DB08	4,3	4,2	5,4	4,9	4,70	0,560	11,910
Ti	(ng/g)	1	F13x	PD01	DB10	1,9	1,8	1,9	1,8	1,85	0,058	3,121
Ti	(ng/g)	1	A36	PD02	DB10	1,91	1,91	1,81	1,91	1,89	0,050	2,653
Ti	(ng/g)	1	A82	PD01	DB10	1,953	1,869	2,019	1,876	1,93	0,071	3,676
Ti	(ng/g)	1	F16x	PC01	DB10	2,012	1,908	1,94	1,921	1,95	0,046	2,385
Ti	(ng/g)	1	A80	PD01	DB10	2,13	2,25	2,18	2,1	2,17	0,066	3,029
Ti	(ng/g)	1	A60x	PD01	DB10	3,1717	2,685	2,2977	3,4434	2,90	0,509	17,565
Ti	(ng/g)	2	A36	PD02	DB10	6,94	7,26	7,16	7,16	7,13	0,135	1,896
Ti	(ng/g)	2	F13x	PD01	DB10	7,8	7,6	8	7,8	7,80	0,163	2,094
Ti	(ng/g)	2	F16x	PC01	DB10	8,403	8,64	8,41	8,478	8,48	0,110	1,299
Ti	(ng/g)	2	A80	PD01	DB10	7,83	8,15	9,12	9,77	8,72	0,891	10,216
Ti	(ng/g)	2	A60x	PD01	DB10	8,6042	8,773	9,9584	7,9873	8,83	0,824	9,333
Ti	(ng/g)	2	A82	PD01	DB10	8,557	8,475	8,721	9,694	8,86	0,564	6,366
Ti	(ng/g)	3	A36	PD02	DB10	3,27	3,27	3,38	3,17	3,27	0,086	2,621
Ti	(ng/g)	3	F13x	PD01	DB10	3,4	3,7	3,5	3,4	3,50	0,141	4,041
Ti	(ng/g)	3	F16x	PC01	DB10	3,647	3,668	3,772	3,75	3,71	0,061	1,645
Ti	(ng/g)	3	A82	PD01	DB10	4,026	3,703	4,093	3,738	3,89	0,198	5,094
Ti	(ng/g)	3	A60x	PD01	DB10	4,152	3,5037	4,2916	4,285	4,06	0,375	9,244
Ti	(ng/g)	3	A80	PD01	DB10	4,02	3,97	4,34	3,99	4,08	0,175	4,278
Ti	(ng/g)	4	F13x	PD01	DB10	3,4	3,7	3,6	3,5	3,55	0,129	3,637
Ti	(ng/g)	4	A36	PD02	DB10	3,6	3,71	3,71	3,6	3,66	0,064	1,738
Ti	(ng/g)	4	F16x	PC01	DB10	3,788	3,68	3,797	3,709	3,74	0,058	1,547
Ti	(ng/g)	4	A82	PD01	DB10	3,728	3,451	3,912	3,954	3,76	0,229	6,087
Ti	(ng/g)	4	A80	PD01	DB10	4,33	3,94	4,34	3,94	4,14	0,228	5,513
Ti	(ng/g)	4	A60x	PD01	DB10	4,8959	4,9588	4,4548	3,8781	4,55	0,499	10,976

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Additional parameters

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Additional parameters

Element	Unit	Sample no.	Lab no.	Method code		Replicates				Mean	Si	Vi
				P	D	1	2	3	4			
W	(ng/g)	2	A80	PD01	DB10	61,3	66,5	64,7	68,1	65,15	2,918	4,479
W	(ng/g)	3	A80	PD01	DB10	2,62	3,73	3,56	4,27	3,55	0,687	19,378
W	(ng/g)	4	A80	PD01	DB10	8,69	9,44	9,18	12,1	9,85	1,530	15,532
Y	(ng/g)	1	A80	PD01	DB10	29,8	32,4	34,8	30,1	31,78	2,327	7,324
Y	(ng/g)	2	A80	PD01	DB10	272	292	333	318	303,75	27,109	8,925
Y	(ng/g)	3	A80	PD01	DB10	6,96	6,79	6,29	9,8	7,46	1,586	21,256
Y	(ng/g)	4	A80	PD01	DB10	51,7	48,8	51,4	50,6	50,63	1,302	2,572

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